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Death by Electrocution.

CONSTITUTIONALITY OF THE STATE LAW SUSTAINED BY THE COURT OF APPEALS.

On Friday last, the day commonly regarded as "Hangman's Day," the court of appeals passed its opinion on the electrical execution law, proclaiming it not unconstitutional and sustaining the decisions of the lower courts.

Commodore Elbridge T. Gerry, who was chairman of the commission, and in whose office the bill was drawn, is in Georgia. Mr. H. D. Hamilton, of Mr. Gerry's office, who was chief clerk of the commission, said that while he could not exult in the fact that the method of Kemmler's death had been fixed, it was nevertheless gratifying to know that the constitutionality of the bill had been settled by the court of appeals. There could be no further legal procedure in the case, and Kemmler would have to die by electricity.

W. Bourke Cockran, of this city, who joined early in the fight, has strenuously argued the unconstitutionality of the law.

While the various appeals have been pending, the number of convicted murderers in the State, the manner of whose death depended upon the issue, has increased to five, as follows:

Kemmler, originally condemned, in whose case the appeal was taken.

Jugigo, who killed a fellow Japanese in a New York boarding house.

McIlvaine, who killed grocer Luca, in Brooklyn, last September.

Slocum, who beat his wife to death with a ball club, in this city.

Wood, colored, who killed a fellow laborer named Charles Ruffin, on the aqueduct, in May last, and was convicted on the 12th inst.

Judge O'Brien wrote the opinion of the court, and, after arguing that the murderer Kemmler was convicted by a court of competent jurisdiction, he continues:

"The only question involved in this appeal is whether this enactment (the law commanding the infliction of the death penalty by electricity) is in conflict with the provision of the State Constitution, which forbids the infliction of cruel and unusual punishment. This provision was borrowed from the English statute passed in the first year of the reign of William and Mary. It enacts that 'excessive bail ought not to be required, nor excessive fines imposed, nor cruel and unusual punishment inflicted.' When this statute was made part of the Constitution of the United States, the word 'shall' was substituted for the word 'ought,' and in this form it first appears in the Constitution of this State, adopted in 1846. It is not very clear whether the provision, as it stands in our Constitution, applies to the Legislature and the judiciary, or as a restraint upon legislation inflicting punishment for criminal offences. When the statute referred to was enacted in England, it was not intended as a check upon the power of Parliament to prescribe such punishment for crime as it considered proper. Its enactment did not deny any law then existing, nor did it mitigate the hardness of criminal punishment in that country. For more than half a century after it appeared on the statute book a long list of offences was punished by death, many of which had not been so punished before the Bill of Rights passed. The ascension to the throne of a new prince was the cause of the enactment of the new law, and it was simply a declaration of the way that the people wanted the government run. But, whatever its origin, we think that its presence in the Constitution of the State confers forever upon the court the right to declare null and void legislative action prescribing unusual and cruel punishment.

"This is the power invoked against the amendment to the Code of Criminal Procedure above referred to by the counsel for the relator, interesting because of its great political research. The power of the legislator over crimes and punishment cannot be disputed. The amendment describes no new punishment for this offence; the punishment is death, as heretofore, the only change being in the mode of carrying out. The death penalty must be accompanied by pain, and is tolerated only because it is necessary for the protection of society. The relator

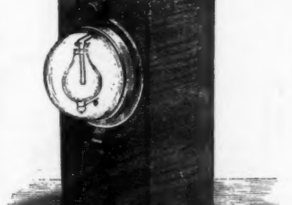


FIG. 1.—ELECTRIC LAMP FOR MINERS.

attempts to show that the new mode is painful. The argument would apply with equal force to any untried method, and if carried out would prohibit the death penalty. Every act of the Legislature must be presumed to be in harmony with the fundamental law, until proved contrary. The testimony of experts is not admissable to show that some clause in the Constitution is violated. If the act on its face is in conflict, then extraneous proof cannot be brought in."

The decision recites the appointment of the commission to investigate a humane method of death punishment and the enactment of the electric statute, and says:

"The amendment to the code making the new penalty is not in general purpose or intent a violation of any provision of the Constitution. The testimony taken by the referee, while not impeaching the validity of the Legislature's acts, is a valuable collection of opinions, but nothing more. The court finds that the mode proposed is not cruel within the meaning of the Constitution, though unusual. On the contrary, all agree with the court below, that it removes every reasonable doubt that the application of electricity to the vital parts of the human body under such conditions, and in the manner contemplated by the statute, must result in instantaneous and consequently painless death. The order appealed from should be affirmed."

Miners' Electric Lamps.

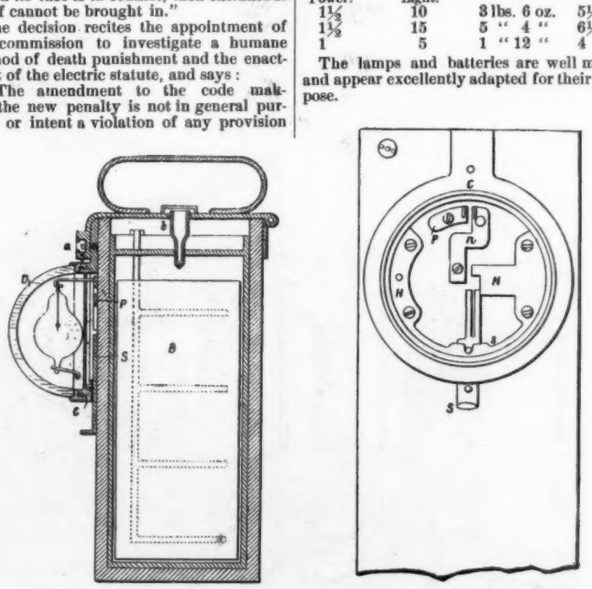
We illustrate on the present page a very neatly arranged miners' electric lamp, devised by Mr. L. Bristol, and recently described in London *Engineering*. The current is provided by a four-cell accumulator, inclosed within a polished wood box, on the face of which the lamp is fixed within a strong glass dome *D*, and backed by a reflector. The box has a metal lid with a projecting lug which covers one of the charging terminals, so that when the lid is closed the battery cannot be short circuited. The lid also carries a lock, *a*, by which it can be secured; a pin on this lock fixes the glass dome against being unscrewed. There is a spring holder for the glow lamp, with two terminal holders. These holders are attached, the one to the positive terminal *P* of the battery, and the other to an independent plate *n*, between which and the negative terminal *N* of the battery, circuit is made and broken by the spring sliding switch *S* passing through a groove behind plate *C*.

The battery plates *B* are of special construction, designed to give them such a degree of self-cohesiveness and rigidity that no additional metallic support is required. There is mixed with the active material a suitable proportion of fibrous substance, and the whole made into a paste. This is cast in moulds, a conductor being inserted in each plate to aid the flow of the current. The plates are then gently pressed and dried. A hollow plug, *b*, is provided for the escape of the gas given off during charging.

These lamps are stated to be much lighter than electric miners' lamps as hitherto constructed, the following being their weights:

Candle-Power.	Hours of Light.	Weight.	Height.
1½	10	3 lbs. 6 oz.	5½ in.
1½	15	5 " 4 "	6½ "
1	5	1 " 12 "	4 "

The lamps and batteries are well made, and appear excellently adapted for their purpose.



FIGS. 2 AND 3.—SECTIONAL VIEWS.

Don't Need to Put Salt on Their Tails.

The question of the wholesale destruction of swallows by electricity has at last been taken up in France and a report on the subject was presented at a recent meeting of the Zoological Society. It is stated that in the South of France long wires are systematically erected along the seashore, and when the tired swallows alight on them they are stunned or killed by an electric shock. The birds are then sent to Paris, where they are used for decorative purposes.

BRUSH WINS.

THE STORAGE BATTERY DECISION DECIDED IN FAVOR OF CHAS. F. BRUSH.

We present herewith the complete text of the decision rendered by Judge Coxe in the suit of the Brush Electric Company *vs.* the Julien Storage Battery Company, which was decided last week in favor of the Brush people. This decision is the result of long and bitter litigation, each side, it is said, having spent over $50,000 on the suit. The printed records of the case make a pile of pamphlets, three or four feet high. The decision is as follows:

THE DECISION.

UNITED STATES CIRCUIT COURT.

SOUTHERN DISTRICT OF NEW YORK.

THE BRUSH ELECTRIC COMPANY *vs.* THE JULIEN ELECTRIC COMPANY, *et al.* } In Equity.

W. H. KENYON and W. C. WITTER, for the Complainant.

THOMAS W. OSBORN (H. M. RUGGLES with him on the Brief), for the Defendants.

COXE, *J.*

This is an equity action for the infringement of four letters patent, granted to Charles F. Brush for improvements in secondary batteries, and now owned by the complainants. These patents are numbered and dated as follows:

Nos. 337,298 and 337,299, were applied for June 13, 1881, and were granted March 2, 1886. No. 260,654 was applied for June 13, 1881, and was granted July 4, 1882. No. 266,090 was applied for June 9, 1881, and was granted October 17, 1882.

The first of these, No. 337,298, which is distinguished as Case I, relates to secondary batteries and consists in a plate or support provided with a mechanically applied coating of absorptive substance adapted to be transformed into an active coating. Also, in a plate or support provided with a mechanically applied coating of granulated, spongy or porous metallic lead. It further consists in the method of constructing plates for secondary batteries, consisting in mechanically coating lead, or other suitable plates, with an absorptive substance adapted to be transformed into an active coating. The drawings attached to the specification represent the supports in various forms. They show plain, studded, honeycombed, corrugated and ribbed plates; plates with angular corrugations, arranged singly or in pairs, and plates with slots or perforations extending through the plates. The active material consists of granular, porous or spongy lead, which is held in position upon the plain plate of lead by a sheet of heavy paper, card-board, cloth or felt, which may be secured to the plate by rivets, ties or binding strips of wood or metal. The paper or felt may be dispensed with, and the spongy lead held in position on both sides of the support by subjecting it to pressure, hydraulic or otherwise. In the corrugated, grooved, ribbed, perforated, studded or cellular plates, the spongy lead may be held in the grooves, cells or cavities by paper or felt, or it may be rammed or pressed into them.

The specification states that: "When a pair of plates are associated together to form a secondary battery, and immersed in dilute sulphuric acid and charged by the passage of an electric current in the usual manner, one of the plates absorbs a large quantity of hydrogen, while the other plate has its spongy or granular portion peroxidized, and thus forms the oxygen element of the battery."

The claims alleged to be infringed are the

first, fifth, eighth, tenth and eleventh. They are as follows:

"1. A suitable plate or support provided with mechanically applied absorptive substance, and adapted for use as a secondary battery element or electrode after being rendered active by an electric current, substantially as set forth.

"5. An improvement in the construction of a secondary battery element or electrode, said improvement consisting in a plate or suitable support provided with grooves, receptacles or perforations primarily coated, combined or filled with mechanically applied absorptive substance, substantially as set forth.

"8. In the process of making plates or elements for secondary batteries, primarily and mechanically applying or combining with a suitable plate or support, an absorptive substance adapted to be transformed into active material, substantially as set forth.

"10. In the process of making a secondary battery plate or element, combining by means of pressure an absorptive substance and suitable material to form a support therefor, substantially as set forth.

"11. In the process of making a secondary battery plate or element, constructing a suitable plate or support with grooves, cells, receptacles or perforations, said plate or support having an absorptive substance primarily applied thereto or combined therewith, substantially as set forth."

The second, No. 387,299, which is distinguished by the inventor as Case J, is for the same invention, substantially, as Case I. The drawings of the two are indentical and the language of the specifications is very similar; where it differs, equivalent expressions are employed.

Perhaps the principal differences are the substitution of the words "active material" for the expression "absorptive substance adapted to be transformed into an active coating," of Case I, and the words "lead oxide" for the "granular or porous lead," of Case I.

The specification in question contains this additional statement:

"Peroxide is the best oxide of lead to use in the preparation of the plates; but as this is rather expensive to prepare, red lead or minium may be used. Some sulphate of lead is liable to be formed when this oxide of lead is employed, by the action of the sulphuric acid of the battery on it before peroxidation or reduction is effected. Protoxide of lead or litharge may also be used, but is objectionable, on account of the large quantity of sulphate of lead which is unavoidably produced by the action of the acid on it."

And also the following:

"I would have it understood that I do not restrict myself to any particular form of active or absorptive material, or to any particular method of applying it to or combining it with the plate or support, as my invention consists, broadly, in a secondary battery plate or element having active or absorptive material primarily and mechanically applied thereto or combined therewith, as contradistinguished from a plate or element having the active material produced by the disintegrating action of electricity, as in the well-known Planté process."

The claims alleged to be infringed are the first, second, third, sixth, seventh, eleventh, twelfth and thirteenth. They are as follows:

"1. A secondary battery element or electrode consisting of a plate or suitable support primarily coated or combined with mechanically applied active material or material adapted to become active, substantially as set forth.

"2. In a secondary battery, an electrode consisting of a plate or support provided with a coating or surface layer of an absorptive substance, such as metallic oxide, applied thereto, substantially as set forth.

"3. A plate or suitable support primarily coated or combined with mechanically applied oxide of lead or equivalent lead compound, substantially as set forth.

"6. A plate or suitable support provided with grooves, perforations or receptacles, and primarily coated, combined or filled with mechanically applied active material or material adapted to become active, substantially as set forth.

"7. A plate of suitable support provided with grooves, perforations or receptacles, and primarily coated, combined or filled with mechanically applied oxide of lead or equivalent lead compound, substantially as set forth.

"11. In the construction of secondary battery elements or electrodes, a plate or suitable support primarily coated or combined with mechanically applied red lead, substantially as set forth.

"12. The method for making plates or electrodes for secondary batteries, consisting in primarily combining active material with suitable plates or supports mechanically, in contradistinction to forming the active material by an electrical disintegration of the plate or support, substantially as set forth.

"13. The method of making plates or

(*Continued on page 9.*)

The Philadelphia Edison Station.

We present in this issue some good illustrations of what is said to be the largest single electric light station in the world. It stands on Sansom street, above Ninth, in Philadelphia, and is operated by the Edison Electric Light Company, of that city. A description of the company and buildings formed part of a supplement in a recent issue of the Philadelphia *Times*.

This station has a capacity of 10,000 horse-power and 40,000 lights, and was built in 1888. The lot covered was 70 feet front by 97½ feet in depth. This space was first covered with concrete, ranging in depth from four to ten feet. The next part of the base of the structure was of granite, five feet thick, and on this came brick work four feet thick, set in cement, and tapering to a thickness of three feet. On this foundation rests the iron work. The building as used now is only four stories high, but when finished will have eight stories, as shown in the illustration.

The six engines (Armington & Sims) are each of 500 horse-power and are connected with 20-inch belts running at the rate of a mile a minute. The dynamos, weighing 18 tons apiece, each carry 3,000 sixteen candle-power lamps. There are at present 12 dynamos, with room for 40. The boilers are about 500 horse-power each and 20 feet high. Over 30 tons of coal a day are used, and in every 24 hours the establishment gives off half a million pounds of exhaust steam. A novel feature of this plant is that the boilers are set on the fourth floor, now the top story; but when the building is completed it will bring the boilers about midway between the cellar and roof.

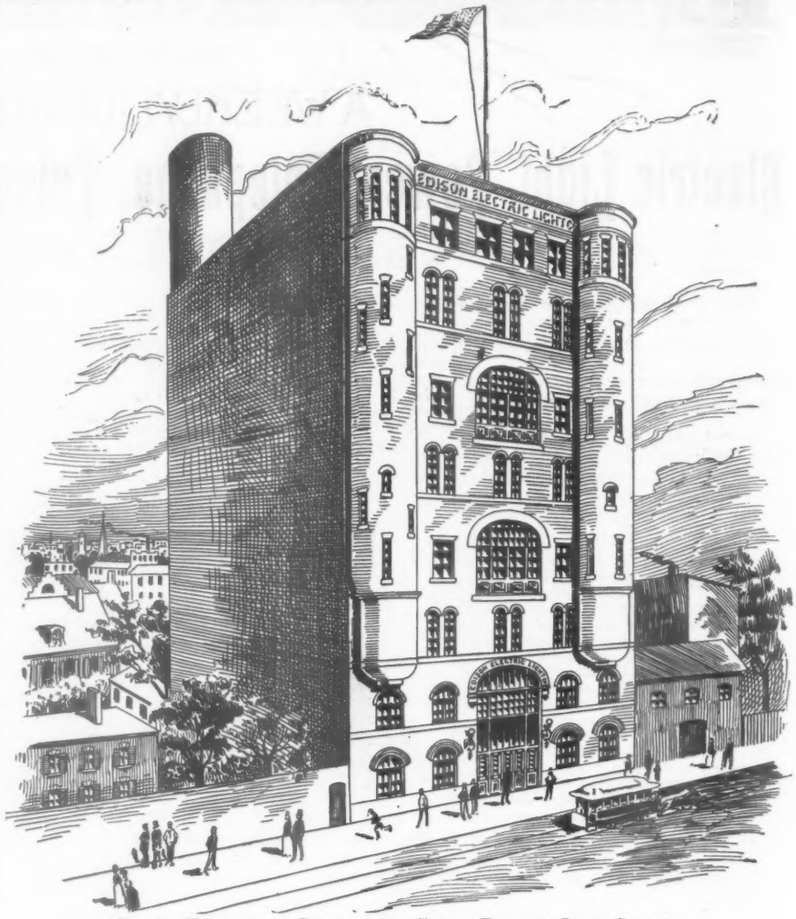


FIG. 1.—VIEW OF THE PHILADELPHIA EDISON ELECTRIC LIGHT STATION.

The company has 34 miles of subway carrying the three-wire system. About $500,000 has been spent on copper alone. The company's plant represents an outlay of $1,500,000, the building costing upwards of $350,000. A specialty is made of supplying power for motors.

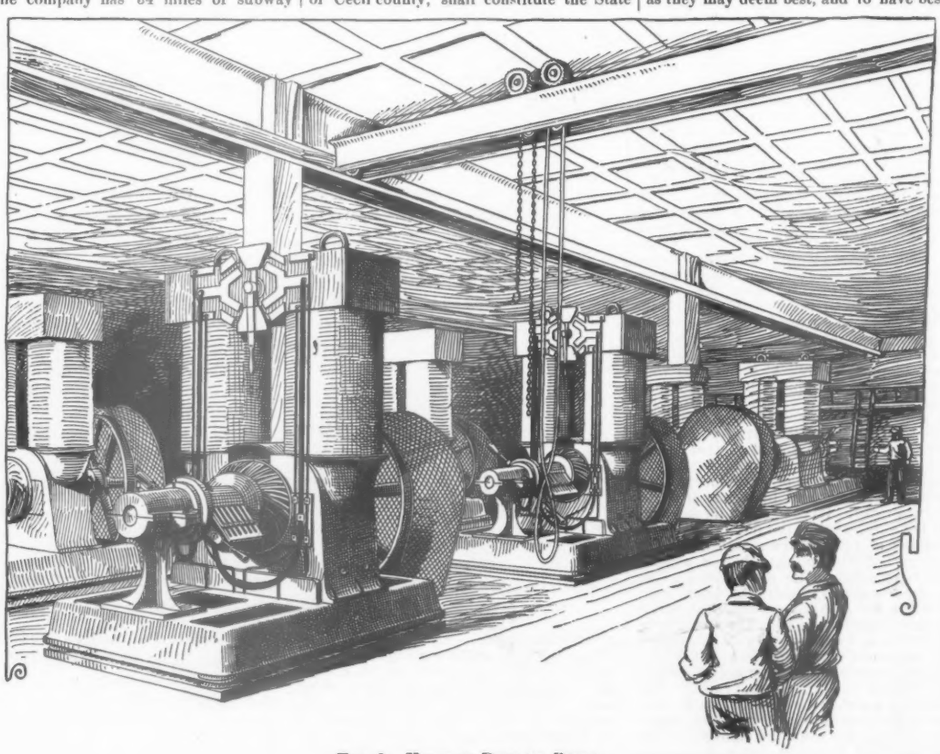


FIG. 2.—VIEW OF DYNAMO ROOM.

An Electrical Commission in Maryland.

Mr. Preston, of Baltimore city, has leave to introduce a bill in the Maryland legislature, creating an electrical commission. It provides that Prof. Louis Duncan, of Johns Hopkins University, Chas. W. Prettyman, of Montgomery county, and Frank R. Scott, of Cecil county, shall constitute the State electrical commission. They are to serve for eight, six and four years, at salaries of $2,000 each. The commission shall have authority to fix the rates to be charged for electric light and power service in each of the cities, towns and villages of this State. They shall have general supervision of electric light and power factories, apparatus and lines, and shall have authority to require all or any electric light and power feeders, mains, wires, lines and conductors, to be placed underground. They shall have authority to require that all overhead lines be located in such places and such manner as they may deem best, and to have besides general control over the construction of conduits or subways to be used for every underground line.

* * Work on the Neversink Mountain Railway, at Reading, is being pushed, and will be completed about April 30th.

A Horse in a Subway Hole.

A 1,300-pound horse fell into a manhole one afternoon last week at the corner of Warren street and Broadway, and it required an hour's time and the efforts of many men to get him out. In the meantime travel was impeded, and a half-dozen policemen had all they could do to keep the crowd moving and prevent accidents. The manhole was open and a gang of men from the New York & New Jersey Telephone Company were making repairs. About the opening was the usual iron pipe guard rail. N. A. Mullen, of Brooklyn, was down in the hole, and the others were on top.

The driver of an ice wagon had just turned into Broadway from Warren street with his horses headed south, when a single truck, going down Broadway in the same direction, struck the pole of his wagon and forced the horse against the guard rail of the manhole. The structure toppled over, and the horse, while struggling for a foothold, slipped in. His hind hoofs rested for a time upon the network of cables in the manhole, while his forelegs, head and shoulders, were outside.

The man who was working below said he heard the guard rail topple over, and jumped to the extreme corner of the manhole, fearing that the rail would fall in. He had barely got of the way when down came the horse, and for nearly 15 minutes he had the liveliest kind of a time dodging the animal's hoofs. The creature struggled furiously, and several times Mullen was kicked in the legs and thigh, but not seriously. He managed at length to get in a position where he was partly protected by the cables, and then, with the aid of the gas main, crawled up to the top and was drawn out by his friends, after a tight squeeze between the horse's body and the edge of the hole. He came up quite pale and pretty badly frightened, but uninjured.

As the horse continued to struggle he lost his foothold on the cables, and then all that could be seen of him above ground was his head and forelegs. At the end of perhaps half an hour he ceased to kick and was dead.

The workmen went down into the hole and found that the horse had kicked one cable to pieces, damaging it to the extent of $100 or more.

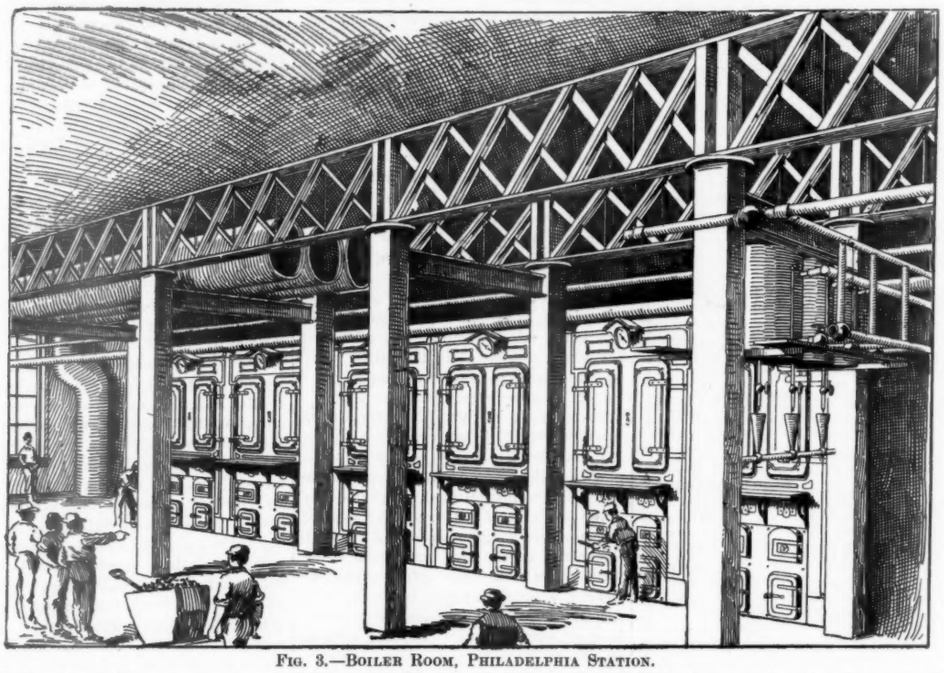


FIG. 3.—BOILER ROOM, PHILADELPHIA STATION.

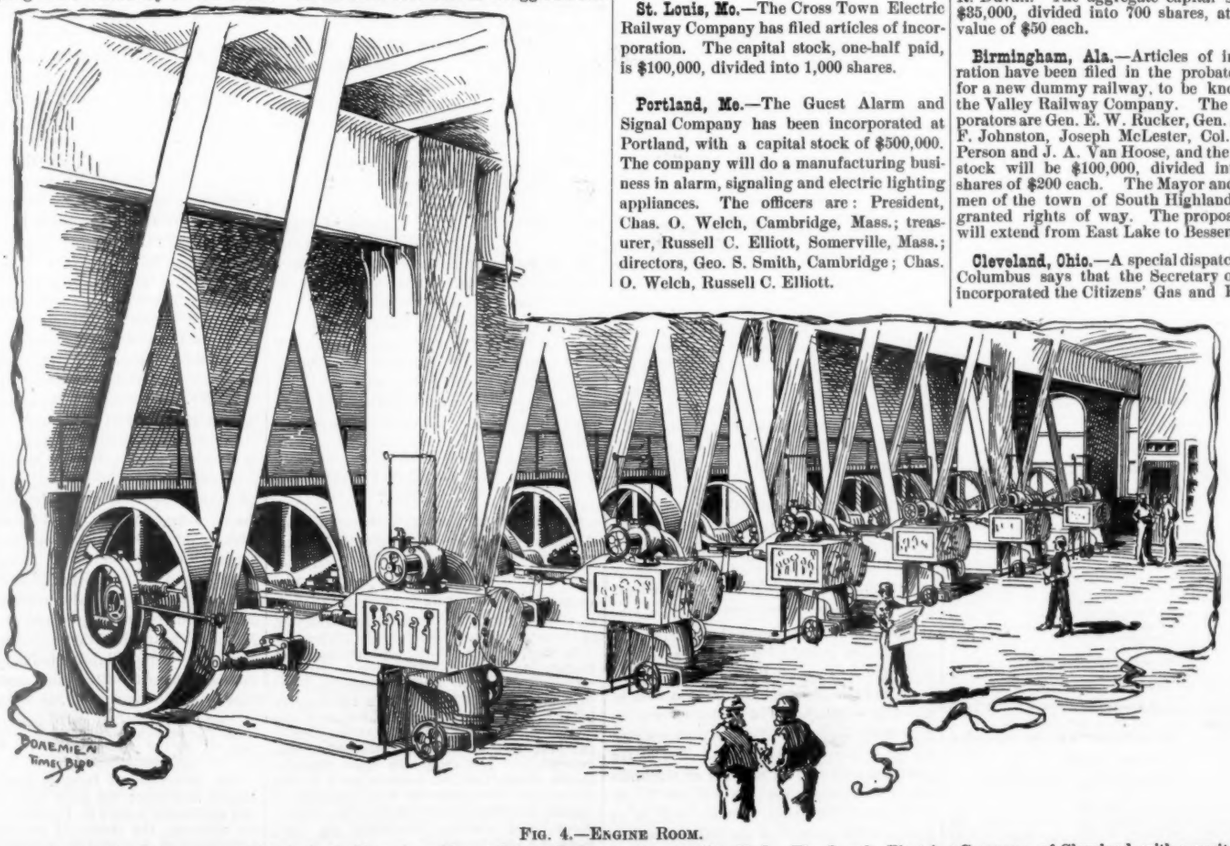


FIG. 4.—ENGINE ROOM.

Topeka, Kan.—The Leavenworth Electric Light Company, of Leavenworth. Directors: Edward Carroll, McCoun Hunt, John Gimper, Leavenworth; and E. Henning, Chicago. Capital stock, $100,000.

Grafton, W. Va.—The Grafton Electric Light Heating Power Company, organized for the purpose of furnishing the town of Grafton with electric power for light, heat, etc., has been incorporated. The authorized capital is $100,000.

Sheboygan, Wis.—The Sheboygan Electric Lighting Company have filed amended articles with the Secretary of State, increasing its capital stock to $50,000.

St. Louis, Mo.—The Cross Town Electric Railway Company has filed articles of incorporation. The capital stock, one-half paid, is $100,000, divided into 1,000 shares.

Portland, Me.—The Guest Alarm and Signal Company has been incorporated at Portland, with a capital stock of $500,000. The company will do a manufacturing business in alarm, signaling and electric lighting appliances. The officers are: President, Chas. O. Welch, Cambridge, Mass.; treasurer, Russell C. Elliott, Somerville, Mass.; directors, Geo. S. Smith, Cambridge; Chas. O. Welch, Russell C. Elliott.

Jersey City, N. J.—The Laredo Electric Light and Machine Company filed articles of incorporation, last week, at Elizabeth, N. J. The company's capital is $100,000, and the places where it will do business are Elizabeth, New York, Laredo, Tex., and New Laredo, Mex.

North Yakima, Cal.—Yakima Electric Light Company, North Yakima. Capital stock, $50,000. Trustees, Edward Whitson, James B. Reavis and Fred. Parker.

Seattle, Wash.—West Seattle Electric Light and Power Company, by Thomas Ewing, H. G. Struve, W. E. Bailey, W. C. Hill, W. H. Llewellyn and G. B. Walker, of Seattle, and G. W. Prescott, of San Francisco.

Bridgeport, Ohio.—A company has been organized at Bridgeport, to build and operate an electric street railway, connecting the Wheeling and proposed Martin's Ferry systems with Bridgeport, and extending back into Belmont county about five miles.

Bucksport, Me.—The Bucksport Electric Company has been organized at Bucksport, with the following officers: President, John Post, Jr.; vice-president and general manager, F. T. Palmer; treasurer, Otis K. Smart. It is proposed to erect a 1,000 incandescent plant.

Omaha, Neb.—Articles of incorporation were filed recently in the county clerk's office for the "New Omaha Electric Light Company." The capital stock is increased to $600,000, and the stockholders are S. L. Wiley, the Thomson-Houston Electric Light Company, Frank Warren, J. J. Everingham and B. E. Sunny.

Baltimore, Md.—The Electrical Construction and Manufacturing Company, of Baltimore City, has been incorporated by Charles Selden, Charles H. Jones, Jr., Charles W. Huntington, John K. Horn and Thomas W. R. Duvall. The aggregate capital stock is $35,000, divided into 700 shares, at a par value of $50 each.

Birmingham, Ala.—Articles of incorporation have been filed in the probate court for a new dummy railway, to be known as the Valley Railway Company. The incorporators are Gen. E. W. Rucker, Gen. Joseph F. Johnston, Joseph McLester, Col. R. H. Person and J. A. Van Hoose, and the capital stock will be $100,000, divided into 200 shares of $200 each. The Mayor and aldermen of the town of South Highlands have granted rights of way. The proposed line will extend from East Lake to Bessemer.

Cleveland, Ohio.—A special dispatch from Columbus says that the Secretary of State incorporated the Citizens' Gas and Electric Company, of Cleveland, with a capital stock of $250,000. The incorporators are Jeptha H. Wade, Jr., Samuel P. Ely, William J. Rainey, Mars E. Wagar and Cyrus P. Leland. An ordinance is now before the board of improvements granting the company the right to lay gas pipes and construct electric wire conduits in the streets of the city.

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CONTENTS.

	PAGE.
Death by Electrocution	1
Miners' Electric Lamps	1
Don't Need to Put Salt on Their Tails	1
Brush Wins	1
The Philadelphia Edison Station	2
An Electrical Commission in Maryland	2
A Horse in a Subway Hole	3
New Corporations	3
The Electrical Execution Law Sustained	4
Storage Battery Decision	4
The National Electric Light Association Abroad.	4
Correspondence:	
Our Washington Letter	5
Our Boston Letter	5
Our Chicago Letter	5
Our Albany Letter	5
Electric Club Volts and Amperes	5
Personal	5
Telephonic News	6
The French Telephones	6
Long Distance Lighting	6
Combination Stationary Motor and Fan	6
The New Electric Insurance Company	7
A New Primary Battery	7
The Huntingdon, Pa., Electric Light Plant	7
Science Has Helped Footpads as Well as Their Victims	7
Hagerstown, Md., is "Bust"	7
The Social Side of the Electric Railway	7
Telegraphic	7
A Telegrapher's Testimony	7
Electric Power	8
In Favor of the Standard Company	8
The Michales Electric Mining Machine	8
Lectures on Electrical Measurements	8
Electric Light News	9
Ohio Electric Light Association	11
Kindred Interests	12
A Million Volts	12
Electrical Patents	12

INDEX OF ADVERTISERS—CLASSIFIED ALPHABETICALLY.

COVER PAGES.

A—American and Foreign Books on Electricity.	2
Ansonia Brass & Copper Co	4
Armington & Sims	4
B—Bridgeport Brass Co	4
Brush Electric Co	3
D—Davis, Charles H., Electrical Engineer	4
Day's Kerite Insulated Wires	4
E—Eastern Electric Cable Co	4
Edson Pressure Recording Gauges	4
J—Jewell Belting Co	4
M—Moore, Alfred F	4
O—Okonite Co	4
S—Simplex Electrical Co	4
Standard Underground Cable Co	4
T—Tucker Electrical Construction Co	4

INSIDE PAGES.

A—Aluminum Battery Electric Light & Power Co	16
Aluminum Brass & Bronze Co	13
American Bell Telephone Co	23
American Electrical Works	13
"Ampere"	12
B—Babcock & Wilcox Co	30
Baker & Co	13
Ball Electric Light Co	23
Ball Engine Co	23
Ball Engine Co	27
Baxter, H. E. & C	28
Bishop Gutta-Percha Co	14
Blanchard, C. M	15
Brownlee & Co	30
Buckeye Engine Co	27
Bunnell & Co	22
Butler Hard Rubber Co	17
C—Cary & Moen	30
"C. & C." Electric Motor Co	17
Central Electric Co	30
Clark Arc Lighting Co	13
Continental Dynamo Co	21
D—Daft Electric Light Co	24
Dwight Slate Machine Co	30
E—Easton Electric Co	30
Eclipse Wind Engine Co	27
Eddy Electric Manufacturing Co	16
Edison Lamp Co	22
Edison Machine Works	28
Edison Manufacturing Co	17
"Electric"	12
Empire China Works	23
Empire City Electric Co	30
Eugene F. Phillips Electrical Works, Ltd	13
Eureka Tempered Copper Co	25
Excelsior Electric Co	24
F—Fallon, John Howard	12
Faraday Carbon Co	25
Forest City Electric Works	21
"For Sale"	12
Fort Wayne Electric Co	32
G—Garvin Machine Co	27
Gassner's Dry Battery	30
Goodrich Rubber Companies	25
Gordon & Co., W. H	13
Greeley & Co., The E. S	12
Greeley & Co., The E. S	28
H—Heisler Electric Light Co	21
Holmes, Booth & Haydens	24
Horn, Brannen & Forsythe Manufacturing Co	33
I—Interior Electrical Conduit Co	28
J—Jarvis Engineering Co	27
L—Lane & Bodley Co	16
Leclanche Battery Co	13
Leffel & Co., James	30
Lehigh Valley Creosoting Co	13
Lynch, E. T., Jr	13
M—Macfarlane & Co., Wm	13
Marshall, Wm	12
Mitchell Vance Co	22
N—National Carbon Co	23
National Electric Manufacturing Co	31
Newark Machine Tool Works	13
New England Butt Co	27
New York Belting & Packing Co	25
New York Electric Supply Co	13
New York Insulated Wire Co	21
O—Ostrander & Co., W. R	16
P—Palmer Bros	12
Partrick & Carter	14
Partrick & Carter	20
Phœnix Glass Co	13
Phosphor-Bronze Smelting Co., Ltd	25
Pond Engineering Co	27
Powell Co., The Wm	25
Q—Queen & Co., James W	28
R—Railway Directory Publishing Co	16
Rice Automatic Engine	27
Ricketts Co., Limited (F. M.)	25
Royce & Marean	12
S—Santley & Co., W. R	23
Sawyer-Man Electric Co	29
Schuyler Electric Co	31
Seely & Taylor Manufacturing Co	28
Shultz Belting Co	14
Solar Carbon & Manufacturing Co	28
Southern Electrical Supply Co	30
Sperry Electric Co	12
Sprague Electric Railway & Motor Co	23
Stephenson & Co., Ltd	21
Sunlight Carbons	25
T—Thackara Manufacturing Co	25
Thomson-Houston Electric Co	19
Trinidad-Heimann Insulated Wire Co	23
Tucker Electrical Construction Co	32
U—U. S. Electric Lighting Co	18
V—Vincent & Co., Charles R	27
W—"Wanted"	12
Washburn & Moen Manufacturing Co	25
Watson & Stillman	13
Weitmyer Furnace	22
Western Electric Co	16
Westinghouse Electric Co	15
Westinghouse Electric Co	26
Westinghouse Machine Co	27
Weston Electrical Instrument Co	16
Whipple Co., Fred. H	21
Williams & Potter	27
Wills, W. M	12
Wilson & Co., R. D	12
Wyckoff Pipe Co	13

With this issue the REVIEW publishes a complete "Index of Advertisers." It will appear each week, immediately following the "Contents," and will be a very convenient reference record.

We present to our readers in this issue an extended collection of legal news. All the decisions quoted are of general interest and great importance. In our last edition we made an exclusive announcement of the decision in the Brush-Julien case, and now take pleasure in publishing the full text of Judge Coxe's decision. The outcome of the New York subway suit will be of especial interest to our local readers, while the decision reached in regard to the electrocution law will be appreciated all over the country as in the nature of establishing a precedent.

The sculptor, Bartholdi, has executed a small rough model of a monument which he proposes to erect in the Square St. Pierre, in memory of the part the balloon took in the siege of Paris. The difficulty was to give the balloon natural proportions without the aid of the usual accessories. The clever artist has arrived at a solution of this difficulty, in representing the balloon by an envelope of thin glass. The net will be of iron, and the interior of the balloon will be occupied by an immense electric arc lamp, which will light the whole place. The *Petit Journal* informs us that a number of the aeronauts of the siege intend to address the government, asking it to take the initiative in a public subscription.

A Parisian entertainment proprietor has enlisted the aid of the electric light in the production of a very effective advertisement. The establishment, which is a public ball-room lighted by electricity, is known as the "Red Windmill." At the entrance is placed a large windmill, the dials of which are studded with incandescent lamps and kept revolving at a rapid rate. The effect is novel and astonishing, and passers-by are at once attracted by such a pleasing and delightful sight, to the great detriment of rival establishments, of which there are several in the same street.

The following incident we can vouch for, and although it has its amusing side, nevertheless the dense ignorance displayed is positively painful. A well-known man in this city contracted with one of the large construction companies to wire a large office building which he owned. The work was finished, the cultured gentleman was invited to inspect it, and the bill was tendered. Payment was refused; and the aforesaid gentleman stated that when the construction company could show him the "*gas coming out of those wires,*" he would pay the bill, and not a minute before. No other test will satisfy him and there the matter rests. And it is almost the twentieth century.

To-day there is scarcely any transaction in which electricity does not play a more or less important role, and now one of the greatest nations of the earth is appealing to our science to furnish an element of novelty to the costly presents with which kings and emperors are wont to accentuate the high esteem in which they hold each other. Among the numerous gifts which the German Emperor has just forwarded by a special delegation to the Sultan of Morocco, is an elaborate fountain provided with all the necessary apparatus for illuminating the jets by electricity, after the style of the electrically-illuminated fountains which have been so successful a feature of recent European exhibitions.

That last week's issue of the REVIEW was out on time, as usual, was nothing remarkable in itself. Yet a $50,000 fire took place in our printing house, the James Kempster Printing Company, only two nights before the day of publication. One-half of the forms were in readiness to go to the presses when the fire broke out, but by rare good luck only a few columns were "pied." The composing room is on the top floor, and the firemen were compelled to cut holes in the roof, through which the streams of water were sent down to flood the building. When the printers were able to make their way through the debris to the composing room, it was found to be a pretty chilly place to handle type. But the brave compositors buckled on their overcoats and went to work with a will, and the REVIEW was printed and mailed to its subscribers on time.

Fire, flood, the Greek alphabet and news from Jersey, have no terror for us or our printers.

THE ELECTRICAL EXECUTION LAW SUSTAINED.

On another page we give the opinion of the court of appeals in the Kemmler case. It was written by Judge O'Brien, and concurred in by all the other judges. The electrocution law is held to be constitutional, and consequently the New York murderers of the near future will die by electricity.

In May, 1889, Kemmler was sentenced, at Buffalo, to die by electrocution in Auburn prison, during the week ending June 24. Since the day of his sentence his lawyers have made a continuous fight against the new method of punishment. At the time of the judgment an exception was taken and overruled. The case was then brought before Judge Day, at Auburn, on a *habeas corpus*, and a commission was instituted to enquire as to the deadly effects of an electric shock, and whether execution by that method would be cruel.

Finally, the writ was dismissed, and the case went to the General Term, where an adverse decision was rendered in December last.

The final appeal in the courts has now been taken and lost, and the law must stand until repealed.

STORAGE BATTERY DECISION.

Judge Coxe, in the United States Circuit Court, Tuesday of last week, handed down a long opinion in the case of the Brush Electric Company, of Cleveland, Ohio, *vs.* the Julien Electric Company, of this city, the company whose storage batteries have been used for traction purposes on the Fourth avenue surface road.

The importance of the case lies in the fact that it was really a trial of the claims of the Brush Company to control the storage battery business in this country. The decision is in favor of the claims of the Brush Company, and its probable effect will be to make a virtual monopoly of the storage battery business, at least until the decision of Judge Coxe can be reviewed upon appeal to the Supreme Court of the United States, which cannot occur short of four or five years at the very earliest.

The broad Brush patents on which the suit was brought were granted in March, 1886, after four years interference with Camille A. Faure and other rival inventors in the Patent Office at Washington. These interferences were all decided in favor of Mr. Brush, and the present final decision of the United States Circuit Court is the legitimate outcome of those earlier decisions in the Patent Office. The storage batteries made by the Julien Electric Company and employed on the Fourth avenue surface road and elsewhere, are held to infringe the Brush patents, and a decree is ordered to be entered for an injunction and for an accounting. Mr. Brush is required to file some disclaimers as to minor claims, but he is held to be entitled to the broad claims of a secondary or storage battery in which the electrodes are made by the mechanical application of an active or an absorptive coating to a suitable support plate. Inasmuch as all the modern commercial forms of storage battery are built in this way and on this principle, the decision is of great importance. The Brush Company's attorneys are satisfied that it subordinates not only the batteries made by the Julien Electric Company, but they claim also the paste batteries made by all the other companies in the market.

THE NATIONAL ELECTRIC LIGHT ASSOCIATION ABROAD.

Our British contemporaries show a flattering appreciation of the labors of the above association. The three English electrical weeklies all refer at length in their editorial columns to the recent successful convention at Kansas City, and some of the more interesting papers are printed either in full or in abstract form. There is a growing feeling in England that with the extension of central station lighting, which, under less restrictive legislation, has been very marked of late, a similar organization for the exchange of practical and commercial information, outside the province of the scientific societies, is becoming somewhat of a necessity. Mr. Crompton, at a recent meeting of the electrical section of the London Chamber of Commerce, pointed out the advisability of facilitating the discussion of just such practical and commercial topics as claim the attention of our conventions, laying stress on the advantages which would accrue to all engaged in central station operation from the exchange of information as to systems of management and experience gained in working. The only way out of the difficulty is for our British cousins to go ahead and start a National Electric Light Association of their own. The electric lighting industry on both sides of the Atlantic would undoubtedly gain by such a movement, as in these days of rapid progress we learn quite as much from the experience of others as from our own.

The incandescent light is coming very largely into favor for large office buildings and apartment houses in London. Builders are adopting the policy of providing each building with a complete installation, as it is found that tenants greatly prefer the electric light to gas. A slightly higher rent is charged to cover the cost of the light, but it is always stated that the electric light is furnished gratuitously, which is not the case with gas, so, of course, the attraction is all the greater.

CORRESPONDENCE.

Electrical Happenings in Washington, Albany, Boston and Chicago.

OUR WASHINGTON LETTER.

The Government Printing Office at Washington has adopted a very practical way of fitting the building with incandescent lights. It has an experienced and competent electrician, who makes the plans and superintends the construction, and the department has the wiring done and buys suitable dynamos from the company that will furnish them the cheapest. The two-wire system is used, and one Edison and one United States dynamo, of about 700 lamps capacity each, are operated singly or alternately, as found desirable to meet the varying requirements of the establishment. Additions to the plant will be made from time to time Mr. Walter Tapley is the electrician of the department.

The Washington Graphophone Company is making very successful use of one-eighth horse-power Perret motors, driven by Julien storage batteries, to operate graphophones. In the office of the Senate official reporters, several graphophones are connected by a shaft and driven by one Westinghouse alternating current motor. This arrangement, which gives great satisfaction, was devised and installed by Mr. Glym, who has charge of all the electric lighting apparatus in the Capitol building, as the representative of the Westinghouse, United States and Sawyer-Man interests. The Westinghouse plant in the Senate and the United States plant in the House of Representatives, are being gradually extended to meet the growing demand for electric illumination. No definite action has been had regarding the architect's proposition to install a complete plant for lighting the entire building.

Prof. Davis R. Dewey, of the Massachusetts Institute of Technology, has been selected by the Superintendent of Census to conduct investigations and collect statistics relating to telephone interests.

The Western Union Telegraph Company is making decided objections to giving certain information asked for by the Census Bureau which, the company claims, would cost it $200,000 to prepare. G. C. M.

Washington, D. C., March 22.

OUR BOSTON LETTER.

Col. Louis W. Burnham, general manager of the Electric Gas Lighting Company, has started on an extensive trip West and South, and expects to be absent from this city about six weeks.

Mr. Geo. W. Davenport, manager of the Thomson-Houston International Electric Company, who has been absent from the city a few weeks, looking after the interests of his company in Cuba, has returned.

Telephone Interests at Auburn, Me., are said to be flourishing. The increase in the local company's business recently has necessitated the immediate installation of a multiple switchboard.

The Jarvis Engineering Company, engineers and contractors, this city, report an active demand in this section for complete outfits for electric power for manufacturing purposes.

An Increase in Electric Lights at the mammoth factory of the Lowell Manufacturing Company, Lowell, Mass., has been made recently. The initial plant consisted of 1,200 incandescent lights (United States system); the present lighting capacity is 2,600 lights.

Mr. J. B. Bennett, manager of the National Telephone Manufacturing Company, of this city, informs me that there is a steadily increasing demand throughout the country for non electrical (or mechanical) telephones for use in manufacturing establishments and large mercantile houses.

The Guest Alarm and Signal Company has been incorporated at Portland, Me., with a capital stock of $500,000. The company will do a manufacturing business in alarm, signaling and electric lighting appliances. The officers are: President, Chas. O. Welch, Cambridge, Mass.; treasurer, Russell C. Elliott, Somerville, Mass.; directors, Geo. S. Smith, Cambridge; Chas. O. Welch, Russell C. Elliott.

Electric Elevated Railway.—At the Massachusetts State House, Monday, the street railway committee gave a hearing to F. A. Bartholomew and others, who propose to build the Riley system of elevated railways in this city. It was proposed to carry upon the structure an overhead conduit for electric wires of all kinds, and to furnish electric lighting to the city in compensation for location accorded.

An Isolated Electric Light Plant has been installed recently in Messrs. Hallett & Cumston's new apartment hotel on Tremont street. The Edison system will be used, and the present plant will furnish 275 sixteen candle-power lights. The New England Wiring and Construction Company, of this city, made the installation; having taken the contract for entire equipment of the plant as well as for the wiring and construction work.

The West End Railway Company, of this city, has adopted safety gates on all its electric cars.

Mr. Herbert C. Wirt, of this city, has patented a new system of electric propulsion for street railway cars.

The American Bell Telephone Company has declared a regular quarterly dividend of three per cent., to be paid April 15.

Electric Cars at Augusta, Me.—The Hallowell & Gardiner Railway Company has contracted with the Thomson-Houston Electric Company for requisite equipment for a three mile electric railway.

Isolated Electric Lights at Lawrence, Mass.—The lower Pacific Mills are being wired for 1,200 incandescent lights (U. S. system); and an additional installation of 600 lights (same system) is being made at the lower Pacific Mills.

The Johnston Electric Train Signal Company is thinking favorably of erecting a factory at Waltham, Mass., where special inducements are offered. The company is capitalized at $500,000, and has been looking around some time for a location in one of the towns which have been trying to secure the industry.

Manager A. N. Sampson, of the New England Phonograph Company, this city, reports business in his line as being unusually active. The company's offices are located in the Boylston Building, corner of Washington and Boylston streets.

Old Lamps Made New.—Mr. A. C. Cary, of Lake Pleasant, Mass., is said to be the inventor of a process by which it is claimed a filament of any incandescent lamp can be replaced, and the bulb cleansed.

The Standard Electric Company, of Vermont, is making a remarkable showing of business for so young an enterprise. In less than one year this company has sold dynamo machines representing a lighting capacity of nearly 11,000 incandescent lights.

Boston Electric Car Service.—According to the chief electrician, Mr. C. F. Pearson, of the West End Street Railway, the company will have 9,500 additional horse-power before November 1. Then the feeders will be put underground, which will obviate the difficulties arising from their coming in contact with other wires. For three months he has been working on and has perfected a switch for cut-outs, that is, where one section of the lines refuses to work because of a short circuit the switch will cut off this section and the cars will be sent over some other route.

The Thomson-Houston Electric Company has leased additional offices in the New England Building, on Summer street near Atlantic avenue. The new quarters will occupy the entire second and third floors of the building above named. The company will retain its offices on the second floor of the Hathaway Building, and these will be in direct connection with, and easy access to, the new offices, by an iron bridge which spans the narrow space between the buildings named. W. I. B.

Boston, Mass., March 22.

OUR CHICAGO LETTER.

The Western Board of Underwriters held their meeting at the Hotel Elms, at Excelsior Springs, the 18th and 19th of this month. The Hon. T. F. Clohesey read a paper on the subject of safety wiring for electric lights.

Personal.—A. L. Ide, of Springfield, Ill., spent a few days this week in the city.—Lafayette Cole, manager of the Peoria Electric Light and Power Company, was a recent visitor here.—Jas. A. Lonsbury, Chicago; Theo. C. Ives, New York; R. I. Sloan, New York; and W. J. Reilly, of Chicago, were registered at the Electric Club this week.—Geo. Cutler left for a trip through the East, on Saturday.

Chicago Fits Them Out.—Rumors that have been prevalent about the enterprise shown by the Japanese have been verified by their purchase of a complete electric light plant from the Westinghouse Company, to light the entire city of Shidzonka, Japan. The Central Electric Company have received the contract to furnish the supplies. These goods are being packed with the greatest care, and will leave for the seaboard by special car on Tuesday next.

The Standard Underground Company, through their Chicago agent, Fred. Degenhart, closed a contract this week for the wires, cables, etc., in the new electric light plant in Yokohama, Japan. This entire plant, including engines, boilers, dynamos, etc., was sold by Chicago houses, the lighting contract calling for 3,500 eight candle-power lamps.

The Thomson-Houston Electric Company, Chicago, report the following sales for the past week: A. W. Wright, Alama, Mich., 20 arcs and 650 alternating, to be used in the Sanitarium Hotel and other public buildings; the Culmer block, Salt Lake City, 150 incandescent; the Manitou Electric Company, Manitou Springs, Colo., increase of 30 arc lights and 300 incandescent; Dr. W. C. Clark's new apartment building, 39th and Ellis avenue, Chicago, 300 incandescent; the Denver Electric Illuminating Company, Denver, Colo., increase of 650 alternating lights. D. B. D.

Chicago, March 22.

OUR ALBANY LETTER.

The Telephone-Electric Railway Case.—The trial of the controversy between the Hudson River Telephone Company and the Watervliet Turnpike and Railroad Company, in which the former seeks to perpetually enjoin the latter from operating its cars within the city limits by means of the single trolley system, came on before the Hon. Isaac Lawson, referee, March 20.

D. Cady Herrick and John A. Delahanty, with Mr. Bowen, of Boston, appeared for the telephone company, and Marcus T. Hun for the railroad company. Others present were Messrs. Baldwin, of Cincinnati; Locke, of North Adams; Chase, of Meriden, Conn.; Farnham, Lockwood and Hayes, of Boston; Doolittle and Reilly, of New York; J. W. McNamara, of the Albany Railway Company; and A. B. Uline, general manager of the Hudson River Telephone Company.

Mr. Herrick, in opening the case, spoke of the organization of the telephone company and the extent of its exchanges and branches, the number of its private subscribers and public stations, and said that it had come into common use. The company was, in fact, a common carrier, without being subject to the liabilities of common carriers. He also described the present construction of the telephone system, the grounding of the wires to make the return circuit, etc. The company had under the law erected its poles and grounded its wires, and under the laws of the State, and with the consent of private owners, its plant extended all over the city. The least volume of electricity being used, it was very easy to disturb and interfere with its operations. The communication must be rapid, and attended by no confusion in order to make it successful. It was the only system used in this country. The company was in the successful operation of its business when it was interfered with.

The defendant insisted that the plaintiff should adopt the metallic circuit. There were three systems of the metallic current. One was the underground, but it would be enormously expensive, and even the defendant would not insist on the plaintiff being put to such an expense. Then there was the aerial system of cable and wire and the all-wire system, in which the wires and poles all over the city would have to be duplicated, new privileges would have to be obtained, and the inconvenience and annoyance to the public by this duplication of wires and poles would be greater. The defendant had been warned before it had put in the single trolley system that it would be resisted. He would show that it could just as easily have substituted a double trolley and operated it successfully, as there were no engineering difficulties to be overcome.

When Mr. Herrick concluded, Mr. Hun moved to dismiss the complaint on the grounds: (1) That it did not state a cause of action; (2) that it does not state facts bringing it within any need of equity jurisdiction; (3) that by the statutes under which plaintiff is incorporated, it is only authorized to use the city streets for its wires "provided the same shall not be so constructed as to incommode the public use of said roads or highways," of which its use for the passage of vehicles is the first or predominant one; (4) that no authority in the plaintiff to carry on the telephone business in the city of Albany is shown by the complaint; (5) that it affirmatively appears by the complaint that the plaintiff has no ownership of the title to the earth or the air which it claims in this case to have the exclusive right to use as against this defendant; (6) that the cause of action as alleged in the complaint is entirely and wholly one for equitable relief; that the order of reference had been assented to under the pleadings as drawn; that if evidence for damages is to be given, or a claim therefor made in this case, the defendant refuses further to proceed under such order and demands its constitutional right to a trial by jury.

Mr. Herrick said that the claim was for an injunction, not for damages. Referee Lawson then denied the motion to dismiss the complaint, and the case was then proceeded with, Herbert Baldwin, electrician and mechanical engineer, of Cincinnati, being called as the first witness on the part of the telephone company.

I. H. Farnham, of Boston, was the next witness called by the telephone company. His opinion was that a double trolley was practicable. It was the better system, and would cause no trouble to parallel telephone wires or lines. The witness also testified at great length in regard to the manner in which the telephone system was affected by the single trolley system, and also gave a practical illustration for the benefit of the referee.—Hearing postponed to April 10.

March 21.—The Senate Judiciary Committee reported favorably Assemblyman Hitt's bill, putting in the penal code the offences of interfering with or destroying the wires, poles, motors, or other appliances of electric railways. Assemblyman Brady introduced a bill which, while intended to benefit the cable system of railways in New York city, may also, as he informed your correspondent, affect the electric railways. It provides that the Board of Aldermen may revise the articles of association of street railways in the city, so far as the matter of motive power is concerned, so as to allow a change in this power. H. L.

Albany, March 22.

Electric Club Volts and Amperes.

On Tuesday, March 18, the annual meeting of the Club, to nominate officers for the year beginning May 1st, was held, and the following named gentlemen were placed in nomination, the election coming off April 17, 1890: President, O. E. Madden; vice-presidents, Grosvenor P. Lowrey, Gen. E. S. Greeley, Erastus Wiman, W. D. Sargent; secretary, Charles W. Price; treasurer, Willard L. Candee; board of managers, J. C. Chamberlain, H. L. Storke, A. H. Patterson, S. Insull, J. J. Carty, J. A. Seely, J. H. Herrick, C. E. Stump, C. H. Barney, H. D. Stanley, Cyrus O. Baker, Jr., Geo. B. Coggeshall, W. J. Morrison; committee on membership, Henry Hine, F. Z. Maguire, George T. Manson, George Worthington, Lieut. F. W. Tappan, U. S. N.

There was quite a gathering of intellect one evening, recently, at the Club, among the number present being Prof. Wm. A. Anthony, formerly professor of physics at Cornell, but now assisting in the practical development of electrical science at Manchester, Conn., where he is the electrician of the Mather Electric Company; Dr. Leonard Waldo, formerly of Yale, but now the very able electrical engineer of the Aluminum Brass and Bronze Company, of Bridgeport, and Dr. Louis Duncan, of Johns Hopkins University, who is winning substantial and well deserved fame as the head of the electrical engineering department of this great educational institution, and who is in charge of the tests of apparatus, which, coming from him, are regarded as authoritative.

The annual election promises to be largely attended. It will occur on the third Thursday of April, probably from 5 to 8 P. M., as heretofore. Plans are already talked of for an inauguration dinner early in May, at which time the newly-elected officers will be given a chance to prove themselves orators.

Among the recent visitors of the Club was Mr. C. A. Merrill, the pencil manufacturer, of Boston, who was initiated into the mysteries of the Club house by Lecturer Charles Dutton.

PERSONAL.

Dr. Louis Duncan, of Baltimore, and Lieutenant Charles W. F. C. Hasson, U. S. N., at present on special work at Johns Hopkins University, were welcome callers at the REVIEW office last week.

Hjalmar von Köhler, Esq., electrical engineer, of Stockholm, Sweden, is visiting in the United States, investigating electrical matters, and takes particular interest in our telephone system, this branch of electrical work having been his specialty.

Mr. Chas. R. Huntley, of Buffalo, chairman of the Executive Committee of the National Electric Light Association, spent a few days in New York last week, investigating the underground question. His company at Buffalo is arranging to bury its electric light wires.

Dr. Geo. H. Benjamin, the well-known electrical engineer, is being congratulated by his friends over the very excellent picture of him which appears in the current *Frank Leslie's*. Dr. Benjamin is one of the most competent of our electrical engineers, and takes an enthusiastic interest in the development of electrical science.

Mr. A. L. Reinman, of the Westinghouse Electric Company, and former superintendent of their lamp factory, will take charge of the company's factory at New York. In mentioning his departure from Pittsburgh, the *Dispatch*, of that city, says: "Mr. Reinman enjoys the reputation of possessing the most thorough knowledge of the incandescent lamp manufacture of any man in the United States."

Mr. Frank W. Harrington, for many years connected with the Western Electric Company, with headquarters at Boston, has tendered his resignation, to take effect April 1. Mr. Harrington is widely known in the electrical field and bears with him into whatever field he may enter the best wishes of numerous friends, including the executive staff of the company with which he was so long identified.

Tuesday evening of last week, before the American Society of Civil Engineers, New York, Dr. Louis Duncan, of the Johns Hopkins University, read an able address on "Some Tests on the Efficiency of Alternating Current Apparatus." A large number of gentlemen were present in the cosy little library and lecture room of the American Society of Civil Engineers, where the paper was read. At its conclusion an interesting and somewhat lengthy discussion ensued, which was participated in by a number of gentlemen well known in the electrical field. In our next issue we will publish the address, and present a full report of the meeting.

Telephone News

⁂ A movement is again on foot, in Chicago, to procure telephone service at something less than the price now paid. In the Legislature of 1889, the bills relating to telephone matters were all defeated, but some unquiet spirits are stirring up the matter again.

⁂ Beware of a telephone in your sleeping-room! Through it you are apt to be made the victim of a practical joke. A gentleman in Buffalo indiscreetly had one of these hello instruments put in his bedroom not long ago. His friends found it out, and now sleep is not a surety with him. He is awakened at the early hour of two in the morning by the obstreperous bell. He arises: "Hello! Hello! You were not in bed, were you!" "Yes, just got out——" "Well, go back to bed again." This from his cheerful companions down at the club. At other times he is called out of bed and asked the hour.

⁂ At a meeting of the directors of the New York & New Jersey Telephone Company, held Friday of last week, Mr. Chas. F. Cutler was re-elected president, and Mr. W. D. Sargent was elected vice-president and general manager. Mr. Sargent has for several years been the very capable general manager of this company, and this additional responsibility and honor comes to him as a proper appreciation of his ability and successful management of the company. Mr. U. N. Bethell was elected secretary and assistant treasurer, and Mr. Alexander Cameron was elected treasurer. The executive committee is composed of Messrs. J. P. Davis, Theo. N. Vail and W. D. Sargent, and president Cutler, *ex-officio*.

The French Telephones.

At a recent sitting of the French Chamber of Deputies, M. Henri Fouquier put a question to the minister of commerce and industry on the eternal telephone queston, in explaining which he said: I have laid on the table of the chamber, 850 petitions from members who complain of the working of the telephone in Paris, and the new conditions imposed on the subscribers by the administration of posts and telegraphs. The subscription henceforth must be taken for three years instead of two; in case of death it remains at the charge of his family. The State reserved to itself, the right of interrupting communications when it thought proper, or to requisition a subscriber's telephone, in case of disorder or fire; those are the conditions which the subscribers criticise. They also complain of the manner in which the service is worked. The insufficiency of this service is recognized by the employés themselves. I wish to ask M. Tirard whether he cannot remedy these deficiencies; it is unjust, for the subscribers begin to be disheartened.

M. Tirard, president of the council, recognized the importance of the question put to him by M. Henri Fouquier. Complaints had been addressed to him on the defects of the service. There was, in reality, a trouble which was due to the epidemic which had reigned over Paris; absent employés had to be replaced by improvised employés. But for some weeks, now, that trouble had disappeared. The administration was endeavoring to improve the service, but it only had in its possession the apparatus which had been left it by the old company. That apparatus was not up to the level of modern discoveries. At the present moment, the State engineers had under consideration a transformation of that apparatus. Yet, as regarded clearness of transmission of the voice there was no system superior to that in working at Paris; still, the administration had decided to give to the telephone service all the improvements necessary. M. Fouquier had complained that the State required a subscription for three years; that clause was rendered necessary in order to allow of the getting back of a little of the arrears. At the end of the third year the subscription would be annual. As to the obligation of the heirs to fulfill the engagements of the deceased subscriber, that was a consequence of the French code. The State reserved the right of breaking the treaty any day it suited it; in short, it wished to suppress the telephonic service of subscribers who should show themselves unseemly before the telephone ladies. The administration would neglect no effort to satisfy its subscribers. All the complaints were the subject of an inquiry; but it was necessary that the public should take into account the primitive state of the apparatus at present in use, and should remember that it must give the State time to perfect it.

Commenting on the above, *Le Soleil* says (and this gives a fair exposition of the views of the press, excepting the official organs): "Every constitution of a monopoly to the profit of the State is a menace to private interests. Thus, when it forcibly made itself master, for its own account, of the telephone lines created by a private company, it was foreseen that the proper use of the telephone would become impossible. That is what has happened; complaints have arisen on all sides, and have often appeared in our columns. Without entering into details of the complaints, they may be summarized in a few words: The apparatus does not work, and the staff works badly; when one desired communication with a subscriber it was necessary to surrender to obtain it; but at night, when the subscriber was asleep, the diabolical ringings of the bell made him jump from his bed; the staff assured him that 'all went well.' While laughing at the public the State has modified the conditions of subscription so as to make a draconian contract; the price and the minimum duration are excessive; the accessory obligations go almost as far as to destroy the inviolability of the domicile. M. Henri Fouquier brought to the tribune the protests of the victims of the State telephones; he discreetly advised the minister of commerce not to exasperate Parisian commerce by neglecting to improve an intolerable situation. 'Improvement,' said M. Tirard, 'certainly; on every rung of the administrative ladder we think of nothing but that.' To prove that, the president of the council, minister of commerce, of industry, of posts, telegraphs, telephones, colonies, etc., paid solemn homage to the regretted M. Coulon, who so short a time since took refuge in the council of State; it is known that, as an improver, that functionary bore away the palm. Again, if the service had been pitiable since the substitution of the State for the company, that was the fault of the influenza; if the staff was crabbed, the reason was the public was not polite; and, therefore, by way of punishment, the favor of subscription will be withdrawn from those subscribers who shall fail in respect to the lady telephonists. Finally, when the means of perfecting the *matériel* has been found, it will be said: 'The *savants*' brains are in labor, gentlemen.' As soon as they have brought forth some discovery the government will claim credit for applying it. But there is no hurry. 'To-day, I say,' proclaims M. Tirard, 'the lines work admirably,' and, as before this assurance some chuckled and some murmured, the imposing orator went on with firmness: 'I know persons are to be found who will say the contrary; well, that is an absolute error.' There! we must teach them how to live, these telephone subscribers. Let them pay the amount of their subscriptions and hold their tongues; that is all that is allowed them by the State worker. As to the non-subscribers, they will only pay their portion of the sums voted. Pay, always pay, and never obtain anything but vexations, such is our lot; the public renders itself worthy of this by its inexhaustible patience."

In connection with the above, a decree has just been published in the *Journal Official* by which every subscriber to a telephone line may obtain on application, if he prove his identity, the privilege of corresponding gratuitously, within the limits of that line, by means of the public cabins connected therewith. Non-subscribers may obtain the same privilege by prior payment of a subscription in accordance with the conditions of the decree dated October 19, 1889. The amount of this subscription per year is fixed as follows: For the Paris lines, 80 francs; for the other subterranean lines, 60 francs; for aerial lines, 40 francs.

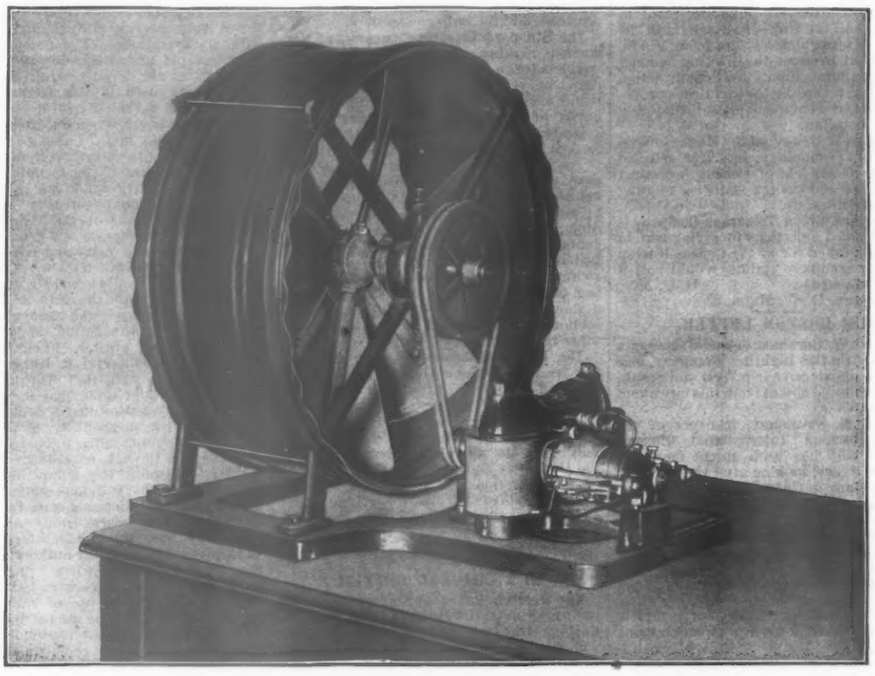
Long Distance Lighting.

An installation of an interesting character has recently been carried out in Derbyshire, England, by Messrs. Verity & Sons, Covent Garden. This is of a gentleman's house, situated one mile from a colliery. The energy is supplied from the colliery engine and transmitted to the house, but as the gentleman would have no high-tension current in the house, preferring rather to pay for cable, the communication was made with 19/14 cable a mile each way, the first part, from the colliery to the grounds being overhead, and the latter part, as soon as it enters the grounds, dipping underground. The current is transmitted at 150 volts, and charges a set of accumulators placed in the house.

Combination Stationary Motor and Fan.

The question of the best method of ventilating naturally suggests itself as the summer approaches, and for that purpose the use of electricity as an agent for transmitting power from a central station to the point of use, holds an unrivaled position. We illustrate a new combination of electric motor and fan which has recently been brought out by the Sprague Company, and which promises to meet a widespread demand for a simple and reliable fan, which can be operated directly from a constant potential circuit. The motor and fan are both on the same stand, the motor being belted directly to the fan. On account of its winding, this motor can be set in operation by the simple movement of a switch, and stopped as easily; there is no necessity of using a rheostat in connection with the motor.

When all the advantages of electric power are taken into consideration—the absence of fire, smoke, ashes, engineer or expert attention—it is not surprising that so many electric motors have been adopted for the general distribution of power, and each new application, like the one illustrated, tends to popularize the use of electric power.



Fan and Electric Motor.

⁂ Rev. A. Streimer, of St. Paul, has applied for a patent on an invention called an electric guest call, for use in hotels. It is an improvement on the system now used in large hotels, by which the alarm in sleeping rooms is given from the office by the clerk. By Mr. Streimer's device the electric call is automatic and is attached to the hotel office time-piece. A guest may choose any hour at which he wishes to be called, and all that is necessary to do is to move a spring on the indicator to the proper place. When the appointed time arrives the action of the clock makes the electrical connection and the bell is automatically rung in the sleeping room.

Experts who have given careful study to the question of smoke prevention, attribute the smoke nuisance largely to the faulty construction of the furnace or smoke stack, defects in the setting of the boilers, want of space in the boiler enclosure, and a false idea of economy, which induces many proprietors to employ men of inferior capacity to attend to the important business of stoking. The remedy for the evil is not in the enforced substitution of coke or anthracite for bituminous coal, but by attaching some good device to the furnace for the purpose of creating better combustion. Observation prompts the suggestion that a coke chamber with an automatic stoker will more effectively accomplish this object. It is held that this is more desirable in principle and available in practice than any appliance yet tested.

The New Electric Insurance Company.

The Electric Mutual Insurance Company will meet this week, in Boston, for organization and adoption of by-laws and election of officers, and incorporation will be effected at once, the incorporators being as follows:

Theo. C. Bates, of Worcester, director of Worcester Electric Light Company; Elisha Morgan, of Springfield, president of United Electric Light Company; F. A. Gilbert, of Boston, president of the Boston Electric Light Company; E. W. Burdett, treasurer East Boston Electric Light Company; W. W. Gooch, attorney Edison Electric Illuminating Company; Gen. B. F. Peach, Jr., Lynn, assistant treasurer Thomson-Houston Electric Light Company; Robert B. Taber, of New Bedford, manager New Bedford Gas Light Company; Thos. T. Robinson, of the Dedham Electric Light Company; S. E. Barton, of Boston, and Wm. Brophy, well-known insurance men of New England.

The company will doubtless be ready for assuming risks about the middle of April, and will be prepared to take the whole amount of insurance to be carried on any station. Arrangement has been made with several of the leading fire insurance companies for re-insuring the surplus beyond what can safely be retained by the Mutual Company.

All the parent companies, as well as the local ones that have expressed themselves in regard to the matter, favor the organization of this new Mutual Company. The Thomson-Houston Company have recently issued the following letter to owners of stations operating Thomson-Houston apparatus:

"We have examined with care a prospectus of an Electric Mutual Insurance Company, just issued by Messrs. Stephen E. Barton and William Brophy, of the New England Insurance Exchange.

"Their purpose is to confine the business of the company to insurance on electric generating stations against loss by fire; accepting at first only such as they have personally examined and know to be desirable risks for a mutual company, and to extend their acceptance of risks only so fast as they can have them examined by competent inspectors and put in an eligible condition by the removal of any hazardous conditions that may be found to exist. All necessary appliances for extinguishing fire will be required before the risks will be accepted.

"It is our belief that the influence and effect of such an organization will be most beneficial to the electric light and power industry, since it will tend to greatly lessen the chances of fire in stations, and the consequent loss by the interruption of business.

"It will also remove every obstacle to obtaining full insurance, and at the lowest cost.

"We would call particular attention to that feature of the prospectus which solicits the placing of the whole insurance with the Mutual Company, who will re-insure in strong stock companies all that they do not deem advisable to retain themselves.

"The advantages of the plan are these: That the owners of stations will have but one party to deal with in the matter of placing their insurance, the inspection of their property, and the adjustment of losses, should any occur. They will also be relieved of the trouble and annoyance of handling a large number of policies, as in the case with the present method.

"The company will employ no agents to whom a considerable percentage of the premium would have to be paid in commissions, and we are informed that it will apply the commissions arising from that part of the insurance which it re-insures in stock companies to the expense of conducting its examinations, thereby giving the insured a direct interest in such commissions.

"The company will, as we understand, be conducted on substantially the same plan as that upon which the Factory Mutuals of New England have been so successfully operated; and the character of the gentlemen organizing it, together with their familiarity with both insurance and electrical matters, lead us unhesitatingly to bespeak for them the earnest support of all Thomson-Houston companies and patrons."

.... At the annual meeting of the Puget Sound Telegraph Company, held at Port Townsend last week, the following directors were elected: Mrs. Sarah E. Minor, Cyrus Walker, Captain Renton, James Goldsmith and Jacob Furth.

.... Another novelty is an apparatus for sharpening or roughing horse-shoes without removal from the feet in frosty weather. This is accomplished by an electric motor and a portable machine, and is one of the newest applications of the electric current.

A New Primary Battery.

The demand for new and improved batteries is part of the recognized business of the progressive electrical age. The new self-sealing, quick acting Disque Laclanche battery recently put upon the market by the Western Electric Company, is meeting with popular recognition. We are pleased to illustrate it in this issue.

The leading features of this battery are, a jar, with shoulder projecting inwards, on the paraffined surface of which a paraffined ring of wood (through which the porous cup and zinc pass) rests. The zinc has a rubber ring both above and below the wooden ring, and the porous cup a paraffined shoulder, making it practically self-sealing. Three holes, about half an inch in diameter in bottom of porous cup, which hangs entirely

clear of the bottom, allow the solution to penetrate the ingredients as soon as immersed and makes the battery quick acting. The manufacturers state that it will give one and one-half volts E. M. F. within one minute after being connected up.

The Huntingdon, Pa., Electric Light Plant.

The electric light plant in this place was put in operation, Saturday, February 21st, by J. Simpson Africa, Jr., three-year-old grandson of ex-Secretary of Internal Affairs J. Simpson Africa. Raised in the arms of his father, B. F. Africa, the superintendent, to the switchboard behind the rapidly revolving spark evolving dynamo in the company's building, he put his little finger to the switch, and in an instant the electric current was sent circulating through the wires, and Huntingdon's 14 miles of streets were illuminated from one end to the other by the brilliant rays that shone from the arc lamps suspended at the alternate corners throughout the town. The effect was truly electrical. The Thomson-Houston system of electric lighting is used.

The station, a brick structure, is located opposite the Pennsylvania Railroad depot, and adjoining the gas works. The boiler room contains two boilers, each of 70 horse-power capacity. In the western end of the building are two dynamos, each operated by an improved Ball engine, one of 80 horse-power capacity, the other of 60 horse-power. The former will run the dynamo to be used in furnishing incandescent light for store-rooms, dwellings, etc., and the other for running the dynamo that furnishes the arc light for lighting the streets of the borough.

The system proved itself a success, far superior to the insufficient, inefficient gas jets which have been in use for many years.

Huntingdon, a town of over 6,000 people, can now proudly say it has one of the finest plants in use to-day, put up in the most thorough and modern manner. Mr. G. S. Smith, superintendent for the Thomson-Houston Company, who is a first-class workman, did the work.

The telephone company, knowing the serious results that would come to their system if the electric light lines ran parallel to their lines in single circuits, requested the electric light company to run their entire system with double circuits, which they did, and the induction troubles are very little, giving no trouble to the telephone people. At first the electric light company declined to parallel their system; but in an experiment made with a single circuit, found that the trouble was of so serious a nature as to jeopardize the business of the telephone company, and immediately made the change necessary.

Huntingdon has not been entirely without electric light all this time. The Huntingdon Car Manufacturing Company put in a Brush plant, in 1880, of 18 arc lights; the Gondola Tannin Company put in a plant in 1885, of 50 incandescent lights; the Pennsylvania Industrial Reformatory put in two systems in 1888, of 60 arc lights on the grounds surrounding the institution, and 1,000 incandescent lights in buildings, with Huntingdon plant of 60 arc and 600 incandescent. This makes a grand total of 138 arc and 1,650 incandescent lights, which at night illuminates the heavens and the earth around here with a light that is almost equal to that of day. D. S. D.

Huntingdon, Pa., March 18th.

Science Has Helped Footpads as Well as Their Victims.

A novel and somewhat scientific scheme for relieving ladies of their purses has been successfully carried out by a gang of thieves along Milwaukee avenue, Chicago, and adjoining streets, for the past week or so. The scheme is to give the victim a violent electric shock, thus temporarily paralyzing her.

The most recent victim was Mrs. Jacobsen, a professional nurse, who lives at 325 West Chicago avenue. One evening recently, about 6 o'clock, she was relieved of a purse containing $12, and several bundles, by the electric method. She was returning home on Centre avenue, near Milwaukee avenue. As she passed in the shadow of a building, two men brushed against her. One of them touched her wrist with a piece of metal. She at once received a violent electric shock that caused her to let go her purse and several bundles, and sent her reeling against the building. She was so dazed for the moment that she did not realize what had happened. As soon as she recovered from the effects of the shock, she began to look around for her purse and bundles. They were not in sight. Then it dawned upon her that she had been robbed.

A similar case was reported early in the week by Miss Czarkofski, a young lady typewriter, who lives on Noble street. Her week's wages were taken.

How the fellows produced the electricity is not known to the police. Some are of the belief that they carry a small battery with them, while others take the view that they attached small wires to the electric light circuit. Mrs. Jacobsen said the shock was so violent, that it stunned her for the time being.

Hagerstown, Md., is "Bust."

This city some time ago abolished the gas lamps and substituted electric lights. These cost the municipality $4.16 per month. For several months the bills were punctually met, but now, owing to hard times, the city is unable to collect its taxes, and the street commissioners have been compelled to notify the electric light company of their inability to meet payment for last month's service. The city council has been urged to provide some means to meet the bill at once. Otherwise the city will be in total darkness. Already some of the merchants, fearing the worst, are preparing to hang out coal oil lamps on the leading thoroughfares.

The Social Side of the Electric Railway.

This is the title of a very interesting address recently read by Mr. T. C. Martin, before the New York Electrical Society. It was an exhaustive *resumé* of the advantage the public enjoys from rapid transit in general and the electric roads in particular. Mr. Martin did not speak of street railways operated by electricity as perfect inventions, but rather as one solicitous for their rapid and enduring improvement. The electrical railway, for obvious reasons, is a potent factor in the social welfare of every citizen. Mr. Martin's paper following that of Mr. Greene on the technical aspect of the electric railway, professed an additional interest.

TELEGRAPHIC

.... The Western Union Telegraph Company will soon locate another line from Tallahassee to Quincy, Fla., to be used exclusively for commercial and local work.

.... The bark "Portland," while being towed to sea out of San Francisco Bay, a few days since, ran afoul of the cable belonging to the Pacific Postal Telegraph Company. At last accounts she has not been liberated.

.... Arthur Henry, the station agent and telegraph operator, at Hartsburg, O., on the Nickel-Plate Railroad, was murdered last week. The office is in a store, and Henry slept there. A burglar gained an entrance to the store, and on Henry's refusal to open the safe, he shot him.

.... The Western Union Telegraph Company has invited the House Committee on Post Offices and Post Roads to visit the company's headquarters in New York, and find out all about the telegraph business. This is the committee that is considering Postmaster-General Wanamaker's scheme for a postal telegraph.

.... The Pittsburgh Central District and Printing Telegraph Company will erect its new building at the corner of Seventh avenue and Montour way. It will cost $165,000. The architect is F. J. Osterling. It will be seven stories high, of the Byzantine style of architecture. The main entrance will be on Seventh avenue. It will have 66 feet front, and will be 100 feet deep. The exchange room will be on the seventh floor.

.... The annual meeting of the Commercial Cable Company was held in this city last week. The following directors were elected for the ensuing year: John W. Mackay, James Gordon Bennett, Hector and Jules de Castro, A. B. Chandler, George S. Coe, W. T. Scott, G. G. Howland, Charles Nordhoff, E. C. Platt, E. J. Matthews, Richard Irwin and A. de Castro. The only new name on the board is that of W. T. Scott.

.... A special meeting of the stockholders of the Postal Telegraph and Cable Company was held a few days ago, and a proposition to increase the capital stock from $5,000,000 to $10,000,000 was adopted, 70 per cent. of the shareholders being in favor of it. The increase is for the purpose of acquiring certain properties which the company has been operating, but which have been owned by John W. Mackay. Among them is the Bankers' and Merchants' Telegraph Company, which was sold about three years ago. A portion of the increase will be applied to the extension of the lines into the West.

A Telegrapher's Testimony.

Mr. Edward Rosewater, the editor of the Omaha *Bee*, and a practical telegrapher, was before the House Committee on Post Offices and Post Roads, last week, and made an argument in behalf of the establishment of a postal telegraph. Mr. Rosewater said he had been for some years manager of the Western Union Telegraph Company, at Omaha, Neb. He said he was convinced that the time had arrived for the government to endeavor to secure control of the telegraph. Mr. Rosewater presented figures showing the expenses and profits on a given wire, and said he thought a 10 or 15 cent rate for messages ought to be remunerative. In regard to the statement of Dr. Green, that it took eight years for a telegrapher to become expert, he contended that a telegrapher who became expert at all was one who became so in four years. One reason why the government should have control of the telegraph lines was that in relation to strikes. Under government control this injurious occurrence would be obviated, as strikes never occurred in the post office or the railway mail service.

* * The Niagara Falls Power Company recently paid into the State Treasury a tax of $2,250 for the privilege of increasing its capital stock from $200,000 to $2,000,000.

* * Mr. L. B. Stillwell, electrician of the Westinghouse Electric Company, read a paper on the subject, "The Distribution of Light and Power by Electricity," before the Engineers' Society, of Western Pennsylvania, at Pittsburgh, Pa., on the evening of March 18.

In Favor of the Standard Company.

Judge Andrews, of the Supreme Court, on Thursday of last week, gave his decision in the important suit by the Manhattan Electric Light Company against Mayor Grant and the Board of Electrical Control.

The immediate question at issue was, whether the Board of Electrical Control should be enjoined from awarding the contract for building electric light subways to the Standard Company, a company in which Mr. Geo. Westinghouse is said to be interested.

Judge Andrews denies this injunction, and dissolves the temporary one granted.

He says the defendants clearly have the right to construct the subways, and to enjoin them would be to inconvenience the public and to delay the repavement of the streets.

In this suit, some of the biggest lawyers appeared, and the fight was a long and bitter one. The hearing lasted three days in Supreme Court Chambers. Elihu Root was counsel for the Manhattan. Other companies besides the Manhattan were interested in the fight against the Standard, among them being the North New York, represented by De Lancey Nicoll; the East River Company, represented by ex-Judge W. H. Kelly and ex-Senator Grady, and the Mount Morris, represented by Assistant District Attorney Foster.

The suit was the result of an attempt made by the Board of Electrical Control to enter into a new contract with the Standard Subway Company to build the remaining subways.

The Standard Subway was represented in the fight by Wheeler H. Peckham, while Corporation Counsel Clark looked out for the interests of the city.

In the course of his written decision, which is a long one, Judge Andrews declares that no allegations of bad faith have been sustained against the Standard.

The purpose of the original contract was to provide subways, the Judge says, and it seems too clear for argument that the contract has been and is wholly ineffectual for the accomplishment of its purpose and the purpose of the act.

The total number of miles of subways constructed compared with the number of miles necessary is very low.

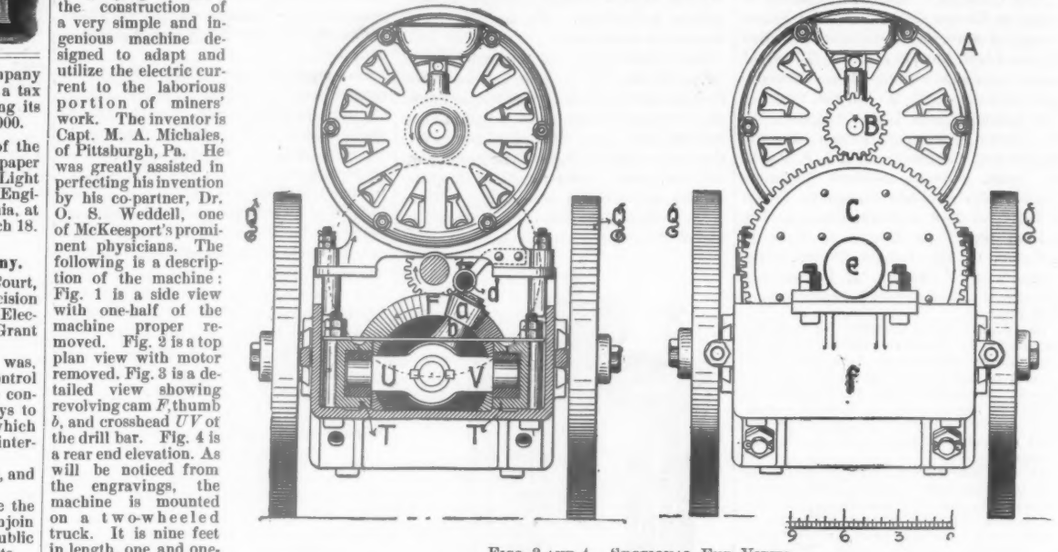
The Michales Electric Mining Machine.

The use of electricity in mines and its introduction for underground work of various descriptions are destined to be most important branches of the industry, especially in combination with lighting. The accompanying cuts show the construction of a very simple and ingenious machine designed to adapt and utilize the electric current to the laborious portion of miners' work. The inventor is Capt. M. A. Michales, of Pittsburgh, Pa. He was greatly assisted in perfecting his invention by his co-partner, Dr. O. S. Weddell, one of McKeesport's prominent physicians. The following is a description of the machine: Fig. 1 is a side view with one-half of the machine proper removed. Fig. 2 is a top plan view with motor removed. Fig. 3 is a detailed view showing revolving cam *F*, thumb *b*, and crosshead *UV* of the drill bar. Fig. 4 is a rear end elevation. As will be noticed from the engravings, the machine is mounted on a two-wheeled truck. It is nine feet in length, one and one-half in breadth, two and two-thirds in height, and weighs about 850 pounds. It is supported with sliding axles, *X X*, for the purpose of balancing when a shorter or longer pick, *R*, is used. It is mounted with a two horse-power Tesla motor, *A*, from which the power is transmitted through a combination of gear-wheels, *B*, *C*, *E*, and shafting *D* to a cam *F*, surrounding the drill bar *I*. Within this cam *F*, on the drill bar *I*, is placed a thumb, *b*, on the end of which is a small trolley wheel, *a*, to prevent friction, as the cam *F* passes in front of it. By the rotation of this cam *F*, its inclined surface, *F*, Fig. 3, passes in front of this trolley wheel, *a*, Fig. 3, forcing it back, and up the incline *F*, Fig. 3, drawing with it the drill bar, *I*, against the tension of a powerful spring, *K*, which encircles it, until the vertical wall of the cam, *F*, passes beyond the trolley wheel, *a*, Fig. 3, when it is automatically released and forced violently forward by the action of the spring, *K*, the trolley wheel, *a*, Fig. 3, returning to the bottom of the incline, *F*. In order to alleviate the shock to which the machine would be subjected in case the pick, *R*, should not strike against the coal, there is an *extremely* powerful spring; *N*, interposed between this shoulder, *M*, on the drill bar, *I*, and the front end of the tube, *L*, which surrounds it. The springs, *K* and *N*, constructed especially for this machine, are of different tension and mathematically correct, and can be changed in a moment as the character of the work requires. The machine strikes 120 blows per minute, with a force of 9,000 pounds to the blow. To convey the current from the dynamo at the entrance of the mine to the motor on the machine, well insulated wires are strung along the side of the entries near the roof, being suitably fastened to the props or plugs placed in the coal for this purpose. Switches are placed opposite the entrance to each room in order to facilitate the changing of the machine from room to room. Wires are coupled to the main circuit in the entry to convey the current to the machine.

The Tesla motor, manufactured by the Westinghouse Electric Company, has been adopted for operating the machine. This motor is peculiarly fitted for mine service, owing to its compactness in design and simplicity of construction. The unique and especially valuable feature is that the current in the armature is an induced current. The ends of the armature wires are soldered together, and there is no electrical connection between the armature and the outside circuits. There are no brushes to require adjustment, or to spark or burn out a commutator. The absence of commutator and brushes allows the armature, which is the only moving part of the motor, to be completely enclosed and protected from mechanical injury. No regulator of any kind is used, and the only piece of apparatus in connection with the motor is a simple switch. Owing to the continuity of the circuit and the absence of brushes and bare contacts requiring adjustment or handling, it is perfectly feasible to use an electro-motive force higher than could otherwise be conveniently handled. The motor has been operated with a pressure of 250 to 300 volts. It can easily be constructed for use with either a higher or lower pressure, according to the requirements in special cases. The extreme simplicity of the electrical part of this mining machine enables it to be put into the hands of miners who have had no previous experience with electrical machinery. One very commendable and unique feature of this machine is that at whatever point in the stroke the pick is arrested, it is instantly returned from that point ready for the next blow; and when the blow is delivered, even though it be arrested in its course, instead of the machine pushing itself away from the coal, as one would naturally suppose it would do, it rather inclines to the coal owing to the momentum of the drill bar. It will not interfere with the working of the machine where it is necessary to post close to the face of the coal.

The machine is light and easy to handle, being composed principally of steel; is very strong and durable, and will stand almost any amount of abuse. It is very simple, beautiful in design and neatly finished. The method of operating this machine is as follows: The machine having been placed to the coal, the operator takes his seat behind it and having perfect control of it, places each blow as would the hand miner, where it will be most effective, cutting from four to six feet deep. This cut is made on a level with the floor, being of a V shape, eight inches in front and tapering back to two inches in the rear, making an average cut of five inches. When the under cut is made, the operator in like manner can shear the end. One great advantage of this V-shaped cut is that, when the coal falls it will roll over and out of its original position where it can be very advantageously loaded.

It requires one man and helper to operate the machine. The machine has been thoroughly tested in the hardest coal in Western Pennsylvania and the results have been of a most gratifying nature to the Michales Electric Mining Machine Company, Pittsburgh, Pa., which controls the invention.



Figs. 3 and 4.—Sectional End Views.

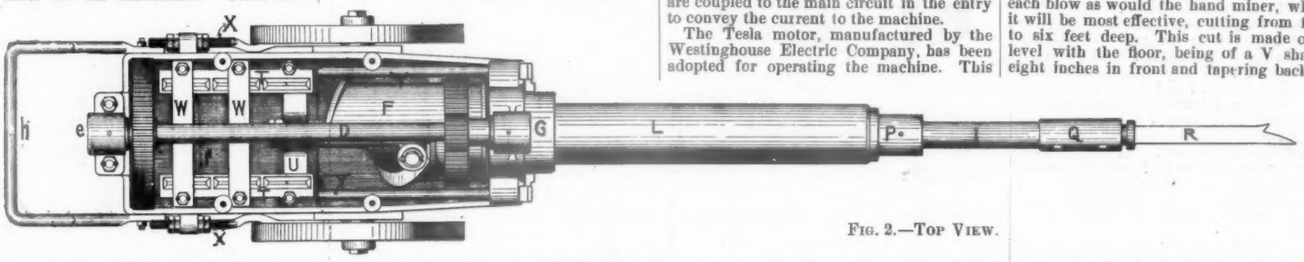


Fig. 2.—Top View.

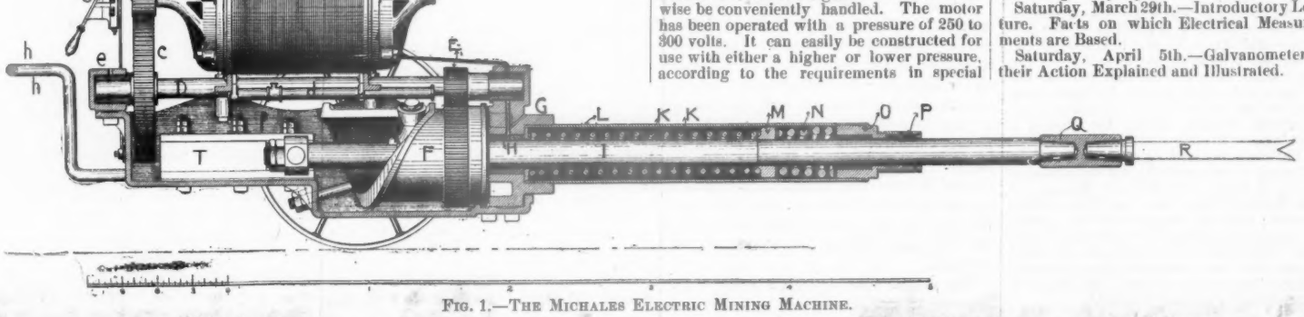


Fig. 1.—The Michales Electric Mining Machine.

Lectures on Electrical Measurements.

The department of electricity, of the Brooklyn Institute, has secured the services of Professor Robert Spice to deliver a series of lectures on the above subjects. The following is a synopsis of the course:

Saturday, March 29th.—Introductory Lecture. Facts on which Electrical Measurements are Based.

Saturday, April 5th.—Galvanometers; their Action Explained and Illustrated.

Saturday, April 12th.—Ohm's Law.

Saturday, April 19th.—Methods of Measuring Resistance.

Saturday, April 26th.—Electro-motive Force; its Measurement. The Volt, the Ampere and the Ohm.

Saturday, May 3d.—The Energy of the Current.

The lectures will be given in the hall of the institute, and will be very clearly and very fully illustrated by the large equipment of apparatus which Professor Spice has brought together for the purpose.

Professor Spice has just finished a similar course at the Cooper Union, in this city

BRUSH WINS.

(Continued from page 2.)

electrodes for secondary batteries, consisting in coating the plates or supports with red lead prior to their immersion in the battery fluid, substantially as set forth.

These two patents, Nos. 337,298 and 337,299, are fundamental patents designed to cover the broad inventions of Mr. Brush.

No. 360,654 is a division of Case J, and is distinguished by the inventor as Case J, Division A.

The invention "consists in the method of making the plates of a secondary battery consisting in forming receptacles for oxide of lead in its surface, then applying oxide of lead to the plates and within such receptacles, and afterwards subjecting the oxide of lead to pressure."

The drawings of this patent are identical with those of the preceding patents, except that Fig. 1, showing the use of card-board or felt, is omitted.

The specification contains the statements above quoted from Case J, relative to peroxide being the best oxide of lead to use, and says, further, that the oxide of lead may be retained in place by being rammed or pressed into its receptacles, cells or grooves.

The single claim is as follows:

"The method of forming the plates of a secondary battery, consisting in forming receptacles for oxide of lead in its surface, then applying oxide of lead to the plate and within such receptacles, and afterwards subjecting the oxide of lead to pressure."

In No. 266,090, distinguished as Case C, the invention consists in a secondary battery element, constructed of cast lead, or other suitable substance, having cells, receptacles, ribs, or projections on its surface, whereby an extended surface of metal is exposed to action.

The drawings are the same as those attached to the preceding patents, with some new ones added, showing the plates arranged, ready for charging.

The specification says of Fig. 4, that it shows a modified form of ribbed plate, resembling an ordinary window blind, with the slats open. It may also be regarded as a thick plate perforated with a series of parallel slots. And of Fig. 5, that it shows the honeycomb form of plate, resembling in construction a simple or double comb of beeswax. It may have its cells extending entirely through the plate.

The plates may be made by pressing plain sheets of lead, or other suitable metal, into dies or forms by hydraulic or other means; also by slotting, punching or otherwise perforating suitable plates and also by casting the melted metal into suitable moulds.

The claims alleged to be infringed are the first, third, fourth, fifth, sixth, seventh, eighth, ninth, twelfth and fourteenth. They are as follows:

"1. In a secondary battery, an element or electrode made up of a series of ribs, substantially as and for the purposes set forth.

"3 A secondary battery element or electrode having its body support or frame provided with ribs.

"4. In a secondary battery, the combination, with one cell thereof, of two or more ribbed plates or elements, substantially as set forth.

"5. In a secondary battery, a plate, frame or other sustaining body provided with ribs or their equivalent, of a less general thickness than the said plate or support, substantially as set forth.

"6. In a secondary battery, a plate, frame or other sustaining body provided with ribs or their equivalents, said ribs or their equivalents being thicker at their bases than at their free edges or ends, substantially as set forth.

"7. A secondary battery element or electrode having its frame, support, or body provided with cells or cavities, the walls of said cells or cavities, or the septa between them, having an increasing thickness from their outer or free edges inward.

"8. In a secondary battery, plates or elements provided with comparatively thin ribs, or their equivalents, for surface exposure, and thicker ribs suitably disposed for supporting or stiffening purposes, substantially as set forth.

"9. A secondary battery having a body frame or support of cast lead.

"12. A secondary battery element or electrode having a supporting body or frame of cast lead for the active coating or substance, said body or frame provided with ribs or projections.

"14. A secondary battery element or electrode having a supporting body or frame of cast lead for the active coating or substance, said body or frame provided with slots, perforations or openings."

The defendants have made, used and sold secondary or storage batteries composed of a series of electrodes consisting of a cast metal support plate, 96 per cent. being metallic lead, and an exterior spongy or porous coating of mechanically applied active material consisting of lead oxides. These electrodes are placed in an electrolyte of dilute sulphuric acid in water. The charging current converts the lead oxide coating upon the oxygen plates into peroxide of lead, and reduces the lead oxide coating upon the hydrogen plates to the condition of spongy or porous metallic lead. The battery is capable of numerous charges and discharges, in the course of which the active material undergoes successive reductions and reoxidations. The lead oxides used consisted generally of minium and litharge, the former largely predominating in the mixture applied to the oxygen plates, and the latter predominating in the mixture applied to the hydrogen plates.

The defences to all of these patents are anticipation, want of novelty, lack of invention, abandonment (except of No. 360,654), and that the claims have been fatally broadened. As to Cases I and J, it is said that the scope of the original applications has been unlawfully enlarged; that the patents expired with an Italian patent to Brush containing the same invention; and, finally, that they are for the same inventions, and that one of them is, therefore, void.

It is, also, insisted that No. 266,090 is limited by the Italian patent. Invalidity and non-infringement of several claims are alleged.

Are Cases I and J for the same invention, and, if so, what course should be pursued regarding them? It will simplify the controversy to answer this question at the outset.

As stated above, the drawings of the two patents are the same, and the language of the specifications and claims are substantially alike upon all matters material. The contention of the complainants is, that Case I is for a secondary battery support, mechanically coated with an *absorptive material*, and Case J for a similar support, coated with an *active material;* "the distinction between the two, relating to the condition and inherent capacity of the material of the coating, as that material exists at the time of mechanical application." For instance, the spongy lead of Case I has, it is said, no oxygen, and is initially absorptive and inactive, while the peroxide of Case J is a fully saturated oxygen compound, and is, therefore, active and non-absorptive. It is admitted that the moment a battery, constructed with plates having either coating, is charged or discharged, all distinction vanishes.

"The fundamental distinction between these patents," says the complainant's brief, "is that in the former the coatings of the secondary battery electrodes are, broadly, mechanically applied *absorptive substance*, while in the latter, these coatings are that class of mechanically applied absorptive substance, defined as active material."

Therefore, both patents, it is argued, are valid.

This question, though it is an accurate statement of the difference between the two, would seem quite tantamount to an assertion that a party may have a patent for a device composed of a combination of iron and wood and a second patent for the same device composed of iron and bass wood or hemlock.

One who has a patent for a combination, one element of which is an adhesive substance, may not have a second patent for a combination, identical in every respect, except that the adhesive material suggested must be moistened before it becomes adhesive.

The coatings of both patents being absorptive and active, is the fact that one, prior to immersion in the electrolyte, *has* absorbed, and that the other *will at once* absorb, a sufficient dissimilarity upon which to base invention? Is it a patentable distinction? The difference is one which would hardly occur to a practical electrician, and even specialists, enthusiastic in the cause of the patent, find it difficult to state it in words which are intelligible to ordinary men. It is too esoteric, metaphysical and minute. It is a mere theory of the scientists and not a fact upon which to found a patent.

The essence of Brush's broad invention was an improvement upon the secondary batteries of Planté, by adding the porous layer, mechanically, to the supports, in the manner described, instead of forming it by the tedious and inefficacious process of disintegration in the body of the plates themselves. When he is thoroughly protected in this invention he has received all that he is entitled to. By taking two patents he should not be permitted to multiply claims which could not stand side by side in one and the same patent.

There seems to be little controversy that *absorptive substance* and *active material* are used in the art as synonymous and equivalent terms, and have been so used since the time of Planté. The inventor, himself, apparently so understands it for he has frequently used them interchangeably not only in his testimony, but in the patent (Case J) itself.

Professor Barker says: "To a person skilled in the art, as it seems to me, the terms are only different forms of expression for one and the same thing. A secondary battery electrode, such as is contemplated in these patents, can consist of but two essential parts: (1) The material of the coating which gives to the battery its usefulness and to which is due its capacity of storing electrical energy, and (2) the conducting frame or support upon which this material is spread. Since upon the former the action of the secondary battery depends, it has become the general practice to speak of it as the 'active material' of the electrode, in contadistinction to the support of the plate itself, which is, or should be, inert. The function of the coating is to change its chemical condition, as, for example, its state of oxidation, so far as to vary this condition in one direction in charging, and in another on discharging. * * * Since, in my judgment, granular, porous or spongy lead, the substance of the first patent, is 'active material or material adapted to become active,' in the words of the second; and since the oxides of lead of the second patent 'are absorptive substances adapted to be transformed into an active coating,' in the first, I am of the opinion that the 'absorptive substance' of the first patent and the 'active material' of the second are to be understood as equivalent terms." The Court is fully satisfied that this conclusion is correct.

The identity of the two patents can best be illustrated by placing similar claims in juxtaposition; the first claim of Case I and the first and second claims of Case J, for instance:

Case I.	Case J.
1. A suitable plate or support provided with mechanically applied absorptive substance and adapted for use as a secondary battery element or electrode after being rendered active by an electric current, substantially as set forth.	1. A secondary battery element or electrode consisting of a plate or suitable support primarily coated or combined with mechanically applied active material or material adapted to become active, substantially as set forth. 2. In a secondary battery an electrode consisting of a plate or support provided with a coating or surface layer of an absorptive substance, such as metallic oxide, applied thereto, substantially as set forth.

There can be no question, if "absorptive substance" and "active material" are equivalent terms that these claims are for the same invention. Each has the following elements: (1) A secondary battery support plate (2) mechanically coated with (3) an absorptive or active material.

The question then is, can a patentee who has received a patent for a plate coated with absorptive substance obtain another patent for the same plate coated with active material? Can an inventor obtain two patents for a broad invention because in one he practices the invention with one substance, and, in the other, he practices it with an equivalent substance? Manifestly not!

After Case I, no one else could have had a patent for Case J, even if confined solely to the points wherein the two are said to differ. The former includes the latter. I am constrained to say, therefore, that the two patents are, in legal contemplation, the same. Although the possibility that the Court might reach the conclusion was stated at the argument, neither counsel offering any solution of the difficulty and none has been offered since. The situation is certainly a unusual one. Here are two patents for the same invention applied for at the same time and granted at the same time. It is true that no injury can result in this particular instance, but what would be the situation if one of these patents were owned by a third party and a suit were brought on it against the defendants for the same infringement, or if the second patent were granted years after the first? If the principle is once established that an inventor can, by such inconsequential changes, as here are shown, obtain two patents for the same invention, the greatest injuries may be done, both to competitors and to the public.

It would seem that as the inventor has given Case I the preference, and as his expert regards that as the broader of the two patents, the difficulty might be met by a surrender of Case J or, perhaps, by a disclaimer of similar claims in Case J, leaving those which have not been brought into controversy or considered, and possibly the red lead claims, to stand. But, as neither counsel has expressed his views on this subject, the method of carrying out the opinion of the Court can best be arranged on the settlement of the decree.

Many of the propositions now advanced were examined and decided, upon identical testimony, by this Court in the case of The Electrical Accumulator Company *vs.* The Julien Electric Company, *et al.*, 38 Fed. Rep., 117. These need not again be considered.

A definition of secondary battery was there attempted, and is now adopted for the purposes of this controversy. When the present inventor refers to a secondary battery, he means precisely what Mr. Faure meant when he used that term.

It was further decided in the Accumulator Case, that the exhibits which were the closest approximations to the invention, were the article from the *Electrician*, of 1863, the report of the Smithsonian Institution for 1858, the Grove gas battery, Planté's descriptions, of 1872, and the patents to Kirchhof and Percival. Faure's claim, before being limited by a disclaimer, was broad enough to

(Continued on page 10.)

—— Vessels in San Francisco Bay are having great success with the Huntington search-light.

—— The Kings County Board of Supervisors have invited proposals for electric lighting in Raymond Street Jail.

—— The Fort Smith Gas Light Company, Fort Smith, Arkansas, have purchased a Thomson-Houston system of 35 arc lights.

—— The ferry steamer "Piedmont," plying in San Francisco Bay, has been fitted out with a powerful Huntington search-light.

—— The Capitol Gas Company, of Sacramento, California, have increased the capacity by adding a 50 light arc machine of the Thomson-Houston system.

—— The village trustees of Canandaigua, N.Y., have contracted with the electric light company of that place to light the town house with incandescent lights at the same rates as paid for gas.

—— The electric light has made its appearance on the Nile. An elegant new passenger steamer, "Rhameses the Great," is fitted out with incandescent lights, electric bells and telephones.

—— The Westinghouse Electric Company has been awarded the contract to furnish an alternating current central station plant with its apparatus for Methuen, Mass. The station will have a capacity of 750 incandescent and 45 arc lights.

—— Owing to the recent explosion of the gas works of the Reading Railroad Company, in Reading, Pa., it has been decided to abandon the use of gas altogether. The works will, accordingly, not be rebuilt, and the electric plant will be increased so as to light all the depots, yards and shops.

—— The annual visitors to Bluff Point, N.Y., may prepare themselves for a surprise this summer because this fashionable resort will have a central station alternating current electric light plant. The Westinghouse Electric Company, of Pittsburgh, Pa., was awarded the contract for the furnishing of the machinery of the plant, which is to have a capacity of 1,500 lights.

—— The Westinghouse Electric Company has been awarded the contract of furnishing alternating current apparatus to increase the capacity of the lighting plant of the Nashville Lighting and Power Company, to the extent of 3,000 incandescent lights; 2,800 lights capacity of Westinghouse apparatus is already in use by this company. In addition to the order for incandescent machinery, the Nashville company has placed with the Westinghouse Electric Company, one for 540 arc lights.

—— The Edison General Electric Illuminating Company, of New York, was recently refused by the Cincinnati municipality the privilege of conducting its wires through underground conduits. Ex-Governor Foraker, attorney for the company, applied to the probate court for a construction of the law in the case, inasmuch as the city's attorney had advised that the city authorities had no power to make a grant to the company. The probate court decided that the city authorities had full power to grant this company its petition.

—— At a meeting of councils in Allegheny City, Pa., held Friday, March 7, Superintendent Hunter reported that the work on the new electric plant is progressing rapidly. The lower portions of the foundations are all completed, 600 poles have been set throughout the thoroughfares of the city, all city buildings have been wired, and it is expected that the power house will be completed by April 1, and the plant will be ready for operation May 1. This plant is to be operated by the city. It will have a capacity of 3,000 lights and will be furnished with the Westinghouse alternating current system.

BRUSH WINS.

(*Continued from page 9.*)

cover a secondary battery electrode, to which the active material was applied, not only mechanically, but by galvanic action, chemical precipitation or in any other way, so that it was not formed out of the plates themselves, in the manner described by Planté.

The evidence referred to, together with the testimony of Mr. Brush, was regarded as sufficient to limit the Faure invention to the application of the active material in the one form described by him, namely, as a paint, paste or cement. What effect the evidence disclosing the prior art had upon the patents in suit was, of course, not directly considered.

In the complainant's brief considerable space is devoted to the establishment of the proposition that Brush was, in legal contemplation, at least, prior to Faure. It is thought that a discussion upon this point is unnecessary. The precise question was presented and decided in the interference proceedings before the Patent Office and in the *Accumulator Case*. The defendants' counsel having there contended that Brush anticipated Faure, recognizes that impropriety of now contending that Faure anticipates Brush, and merely submits the testimony in this behalf without comment. The decision heretofore made upon the same state of facts will, therefore, be adhered to. It was there decided—although the date was not definitely fixed—that Faure, being a citizen of France, and having conceived his invention in a foreign country, was not permitted to claim it here earlier than the date of the delivery of his French patent—December 7, 1880. Faure's contributions to the art need not, therefore, be considered in this action.

The proof now offered to establish invention was carefully examined in the *Accumulator Case*, and it was held that "the evidence of Mr. Brush as to what he accomplished in 1879 and 1880 must be accepted as true."

What did Brush accomplish?

A history of his experiments and their results is given at length in the other case (pages 129, 130, 131), and need not be again repeated. In brief, it is this: In the summer of 1879 he made secondary battery electrodes by applying to suitable plates an active or absorptive coating consisting in three instances, respectively, of metallic lead in the form of fine powder, red oxide of lead and litharge. These coatings were held in place by a piece of blotting paper, a strip of wood and a string wound tightly around the whole. In July, 1880, he made lead plates with deep grooves, into the grooves of some he rammed yellow oxide of lead and in others sulphate of lead. In September, 1880, he made six plates grooved by a gang of circular saws and filled the grooves of two by ramming them full of litharge, and of two others by ramming them full of sulphate of lead. The electrodes thus constructed operated successfully in secondary batteries and produced satisfactory results.

Many other structures leading up to the invention were made, but it is not necessary to consider them in detail. It may be said, however, that from the time the idea first entered his mind until the applications were filed, Mr. Brush was engaged, almost constantly, in progressive experiments and investigations.

For the reasons stated in the *Accumulator Case*, it is thought that this invention is not anticipated by the testimony of Professor Van der Weyde, the article from the *Electrician*, the Smithsonian report, the Grove battery, or the patents to Kirchhof or Pulvermacher. (39 Fed. Rep., 490.)

It was said of the patent granted to George G. Percival, April 3, 1886: The idea of Percival, also, as shown in his United States Patent, No. 53,668, was to improve on Planté's method by saving time and expense. He describes a secondary battery consisting of one pair of electrodes placed in a watertight wooden box, divided in its center by a porous partition. On each side of this partition is a layer of powdered gas carbon. These layers constitute the two electrodes, and when in use they are wet by a proper solution. For convenience in establishing connection with these layers there is on each end of the box a screw cup fastened to a strip of copper which is in contact with the carbon. "Lead or any other suitable metal in the form of a coarse powder may be substituted for the gas carbon. This appears to be somewhat analogous to some of the forms described by Faure. The complainant contends that the reference is valueless, for the reason that there is no suggestion of a conducting support plate like Faure's which holds the active layer and conducts electricity to each and all parts of it, so that the whole material instantly becomes spongy, and thus capable of receiving and discharging electricity. In short, that the Percival battery is without the Faure support plates." (Accumulator Case, 38 Fed. Rep., 126.)

It is argued that this patent is an anticipation of claims 1 and 8 of Case I. This is probably true if a very broad construction is placed on these claims, but there is nothing in the record requiring such a construction. There is no evidence that a Percival battery was ever used or could be made operative. His invention does not seem to be on the line subsequently followed by Brush. He has no plate or support at all resembling those of the Brush patents. He has no *coatings*. His two copper connecting slips *support* nothing. The pulverized gas carbon is not mechanically applied to them; they are simply in contact with the gas carbon. Their presence is not necessary; they are put there for greater convenience only. Percival's electrodes are not coated supports at all; they are cells filled with coarse conducting powder and divided by a porous partition.

Percival's claim is for: "The forming of the electrodes of a secondary pile of layers of gas carbon or some other conducting powder, substantially as and for the purpose hereinbefore described."

Is it not clear that he did not have in mind a lead, or other suitable plate, with a layer or coating of active material mechanically applied thereto?

It would seem, then, that nothing in the record anticipates the Brush patent, Case I, when a construction commensurate with the invention is placed upon it.

He did not invent secondary batteries, or electrodes for such batteries having a layer of active material, or the use therein of a conducting powder, but he seems to have been the first, in this country, who held the absorptive substance, in the form of dry powder, in place on the supports by paper or equivalent material, and the first who rammed or pressed it into grooves or receptacles in the plates.

The invention of Case I was not abandoned by description in patents No. 261,512 and 261,995, granted to Mr. Brush, respectively, July 18 and August 1, 1882.

There is no evidence as to when the applications for these patents were filed, other than the date appearing upon the specification, and this would seem to be insufficient proof of the fact. But accepting this date, June 9, as the true one, only four days elapsed before the filing of the application of Case I—June 13.

The inventor was not responsible for the delay in the Patent Office, which was occasioned by interminable interference proceedings between him and other inventors. His intention not to abandon is demonstrated by the fact that the application for the patent in suit was made out and sworn to two days before the application for the prior patents was filed.

In Holmes *vs.* Alarm Company, 33 Fed. Rep., 254, this Court decided that where a patent fully describes an invention which could be claimed therein, and makes no reservation and gives no warning to the public, a second patent granted upon application filed months after the first patent was issued, which claims simply the invention previously made public, is invalid, but the Court also used the following language, which seems quite applicable here:

"This is not the case of a patentee who has made application for the second patent before the first is issued. It would be manifestly unfair to hold him responsible for the action of the Patent Office in this regard."

It is thought no authority can be found holding an invention abandoned upon such facts as are developed. I should be sorry to make a precedent now which can have little but the most technical reasoning to support it.

The patent is not invalidated by the introduction of the descriptive term, "absorptive substance," after the original application was filed. The claims, as originally stated, use the language "mechanically applied porous, granular, spongy or equivalent lead." The claims as issued, substitute the words, "mechanically applied absorptive substance." This did not change the invention. It was the employment, simply, of more apt and artistic terms for the comparatively clumsy language of the original.

It is argued that claims 5 and 11, of Case I, have been unlawfully expanded by the insertion of the word "perforations" therein. Neither the specifications, claims or drawings, as originally filed, mention perforations extending through the plate. They first appear in an amendment filed June 1st, 1882.

Prior to this, in the summer of 1881, Prof. Eaton had made perforated secondary battery plates. (Accumulator Case, 38 Fed. Rep., 141.) John S. Sellon and Joseph Wilson Swan had described similar plates in their patents of March 10, 1882, and November 22, 1881, respectively.

It is not contended that Mr. Brush ever made such a plate. There is no proof that he did and he testifies that he cannot recall having done so.

The value of perforations extending through the plate seems to be conceded. Proof of the advantages of this construction appears in the record, and the language of Sir William Thomson, who testified in the previous case, may be adopted as an epitome of what is affirmed by the witnesses here. (See Accumulator Case, 38 Fed. Rep., 140.)

The complainant's brief contains the following:

"Thus perforations may in his view be a specific improvement over recesses or receptacles broadly considered, but recesses broadly considered in combination with the mechanically applied, active or absorptive material in a secondary battery, is the subject of the claims now under consideration." And again, "as to the improvement in recessed plates which consisted in carrying the recesses through the plates and forming perforations, Mr. Brush has no separate claim for that specific improvement. Defendants insist that Swan has the prior right to that specific improvement, Brush's claims are for the broad ground of a recess, and it may be that Swan is entitled to be considered the first who carried the recess through the plates, making a recess which was also a perforation. But that question does not arise here."

But it seems that the question does arise. The claim is certainly susceptible of a construction covering a plate containing receptacles not only, but also perforations which go entirely through the plate. In other words, it may be construed to cover the features Mr. Brush is entitled to as well as the one he is not entitled to. So construed, an infringer after paying complainant for the use of the recesses which belong to Brush might also be compelled to pay for perforations which, so far as this patent is concerned, belonged to some one else—Eaton, Sellon or Swan. Neither of these gentlemen, if he had a patent for this specific improvement, could prevent complainant from using perforations as distinguished from recesses.

The common meaning of "perforation" is a hole or aperture passing through a body. It is argued that the patentee intended that this meaning should be adopted, for he says: "Fig. 8 shows a vertical section of a ribbed plate provided with slots or perforations extending through the plate." And yet, other parts of the specification would indicate that he intended to make no distinction between perforations and receptacles. As before stated, the language quoted first appeared a year after the original application was filed. The Court has grave doubt, therefore, whether these facts do not bring the case within the rule laid down in Railway Co. *vs.* Sayles, 97 U. S., 563; Kittle *vs.* Hall, 29 Fed. Rep., 508, 514, and cases cited.

But consideration should be given to the unusual circumstances attending the filings of so large a number of applications and drawings at or about the same time. The inventor seems to have thought that by cross-references the information contained in all could be imported into each separately. This certainly bears upon the question of intent. The drawings which he afterwards filed in Case I were in fact filed with Case C, and were in the Patent Office when the application for Case I was filed. The third claim, as originally proposed, covered a ribbed, honeycombed or equivalent plate. If the claims, as finally allowed, may be construed to cover nothing more than a honeycombed or equivalent plate, which certainly contemplates a plate containing cells or cavities, can it be said that the claims in question have been fatally expanded?

It is true that the ordinarily accepted meaning of the word "perforation" would imply an opening extending entirely through the plate, and such an opening the inventor could not engraft upon the original application. But the word may also have a meaning synonymous with "cavities" or "cells"; it may mean a hole not passing entirely through, but into the center or interior, and a plate with such perforations the inventor was at liberty, it would seem, to claim under the original application.

Such a construction does not interfere with the rights acquired by the public, for it does not permit a broadening of the claim. It holds the inventor strictly to what he asked for in the first instance.

When, by a liberal construction, a patent may be sustained, is it not the duty of the Court to adopt it rather than one which, though possibly more plausible, will deprive the patentee of the fruits of a meritorious invention to which he is fairly entitled?

With considerable hesitation I shall hold that these claims, as thus construed, are valid. That they are infringed there can be little doubt. The defendants' electrodes have receptacles; they may be improved receptacles, but they are receptacles nevertheless. These claims do not cover the improvement.

Regarding the pressure claims, so-called, the defences are that they are void for want of invention, and if a construction is placed upon them sufficiently narrow to enable them to stand, the defendants do not infringe.

The tenth claim of 337,298 is as follows:

"10. In the process of making a secondary battery plate or element combining by means of pressure an absorptive substance and suitable material to form a support therefor, substantially as set forth."

The only claim of No. 260,654 is as follows:

"The method of forming the plates of a secondary battery, consisting in forming receptacles for oxides of lead in its surface, then applying oxide of lead to the plate and within such receptacles, and afterwards subjecting the oxides of lead to pressure."

The latter is a narrower claim than the former, being limited to oxides of lead, to support plates having receptacles and to pressure after, and, therefore, in addition to, the mere mechanical application.

It is not denied that the prior art plainly reveals the use of pressure in making primary battery plates. The distinguishing feature of the invention of these claims is *pressure*. Every other element is covered by other claims. It is argued with plausibility and force that it is not invention for the patentee, with the coated plate before him, to subject it to treatment which he could easily have learned from Leclanche and others.

It is said that the function of pressure is the same whether used on a primary or secondary battery electrode, and that the claim cannot be upheld by importing into it all the valuable features of the broad invention.

It is contended for the complainant, on the other hand, that pressure applied to secondary battery plates produces an entirely different result and performs an entirely different function from that produced when applied to primary battery plates.

If the claims are limited to the use of hydraulic, or other similar pressure, the Court, as now advised, would be inclined to recognize the force of the complainant's contention.

But the construction asked for is broad enough to cover the application of the absorptive material with trowel or spatula and the incidental pressure attending this operation.

Says the complainant's expert: "In the plates of defendants' battery I find a series of small cells perfectly filled with an apparently uniform and extremely even mass of absorptive material; I know of no way in which this could have been effectively done except by spreading and forcing into the perforations the absorptive substance, either in the form of a paste or of a powder; generally the application of the absorptive substance to the plate is accomplished by means of a trowel or spatula; the support is usually laid upon a slab of some material such as slate or glass, and the absorptive material, in the form of powder or paste, is spread over the plate and forced into the perforations; considerable pressure is always applied to the material to force it into the receptacles; the excess of material is removed by a spatula or some equivalent implement, and the plates are then quite smooth, the absorptive material at the receptacles having almost the thickness of the support plate. From a careful examination of defendants' batteries, and from my general knowledge as to the methods employed, I am of the opinion that the absorptive material has been applied in substantially the manner of the tenth claim above described, and that considerable pressure has been employed in the operation."

There can be no doubt that a construction as broad as here demanded would invalidate the claim. It would cover a well-known and exceedingly simple operation. It would cover the mechanical application of the coating. It is hard to conceive how it could be made to adhere without some degree of pressure. Even the blotting paper, stick and string, of the 1879 electrode, would infringe. Pressure, such as this, it is believed, was not contemplated by the inventor. He had in view pressure plus the mechanical application, by means of which the coating would adhere more perfectly not only, but by which better conductivity could be obtained.

But if the narrower construction is given these claims the defendants do not infringe; at least they have not been proved infringers.

I do not lose sight of Mr. Weston's later testimony, taken April 3, 1889, but it seems to me that it adds nothing to his former statements, upon which the Court would be warranted in acting. It is hearsay merely and wholly indefinite as to time. The bill was filed in April, 1887, alleging that before the commencement of the action the defendants had infringed. This allegation is hardly sustained by the testimony of a witness taken two years later, that he has been informed that the defendants have infringed for "some time."

This stipulation, signed by the defendants' solicitors, designed to cover undisputed matters upon the subject of infringement, makes no mention of pressure.

Case C, No. 266,090, contains two classes of claims. The first class (claims 1 to 3, inclusive) relates to the form of the plates, the second class (claims 9, 12 and 14) to the material of which the plates are formed.

Claim 7 relates to a secondary battery electrode, having its support provided with "cells or cavities." The other claims of the first class, relate to "ribs."

Claim 14, in addition to the element of cast lead, has also the element, not elsewhere claimed in this patent, of "slots, perforations or openings."

It is said that the defendants do not infringe the claims of the first class, other than the seventh, for the reason that they do not have a ribbed support plate. The language of the seventh claim described with much

greater precision the defendants' supports than that of any other claim of this class. They certainly use cells or cavities. Whether they use ribs or not is, at least, doubtful.

If there were nothing in the art but the contributions of Mr. Brush, it is evident that a narrow construction must be given to these claims. Every word by which even a shade of distinction in the formation of these plates can be expressed, has been adopted. Advantages of the most surprising and mysterious character are said to lurk in the slightest change of size, shape or depth, in the holes or recesses. In these circumstances, a different rule should be adopted than if the art showed that all these methods of keeping the active material in place are, substantially, equivalents.

The defendants use a support filled with rows of uniform square holes. The Court is not prepared to say that the walls between these holes are ribs. The ordinary meaning of the word would have to be strained and distorted to make it cover the "partitions or septa between the cavities," and especially so in an art where a restricted meaning is required. A careful reading of the specification confirms the impression that the patentee intended to use the word, not as now asserted, but in its ordinary sense, as synonymous with projections or ridges. He intended to draw, and does draw, a sharp distinction between plates with ribs and those with cells, cavities and perforations.

Claims 9 and 12 are clearly void for want of patentable novelty. Their only distinguishing feature is cast lead. The complainant, if its position is correctly understood, does not assert that there is anything patentable in casting lead. It is not alleged that the eleventh claim, which covers the process of casting, is infringed. Not only every skilled mechanic, but every school boy who has experimented with melted lead, who was shown a model of defendants' grid, and asked to make a series of them, would at once suggest the idea of casting them in moulds. This proposition is, virtually, conceded by the complainant's counsel, for, in speaking of the advantages of casting, over rolling or pressing, they say: "If this latter were the only advantage and the only mode of operation and result, then the invention would be old in any casting of a complex form, and that is the plane on which defendants' deal with this invention; but the true understanding of the invention shows that it had its birth in the needs of secondary batteries that operate by expansion and contraction of a permanent coating which must not be allowed to get away from its support, and that its peculiar mode of operation and advantages exist only in such a battery."

What, then, is the novelty upon which these claims are sought to be sustained? It would seem to rest solely on the theory that cast lead produces better results on a secondary battery than rolled or pressed lead. A patent cannot stand, for a moment, upon ground so narrow. Lead plates were old in secondary batteries, cast lead plates were old in primary batteries. The art of casting was old and free to all. The form of the plates desired would suggest casting them to the skilled artisan. This right being clear it is idle to assert that one may cast his plates but shall not be permitted to use them after they are cast. It being quite impossible to pour melted lead into moulds without producing cast lead, the question arises: Can the person who first uses this obvious process in making secondary battery plates not only obtain a monopoly of the product but of the process as well? Manifestly not! It is not even the substitution of one known material for another. It is the substitution of one well-known form for another well-known form of the same material.

In Hotchkiss *vs.* Greenwood, 11 How., 248, the Court say: "The improvement consists in the superiority of material, and which is not new, over that previously employed in making the knob. But this, of itself, can never be the subject of a patent. No one will pretend that a machine made, in whole or in part, of materials better adapted to the purpose for which it is used than the materials of which the old one is constructed, and for that reason better and cheaper, can be distinguished from the old one, or, in the sense of the patent law, can entitle the manufacturer to a patent. The difference is formal and destitute of ingenuity or invention. It may afford evidence of judgment and skill in the selection and adaptation of the materials in the manufacture of the instrument for the purposes intended, but nothing more."

See also Bushing Co. *vs.* Doelger, 23 Blatchf., 167, and cases cited.

With every disposition to act with liberality toward those who, with undoubted genius and untiring research, are developing this recently discovered mine of industry, the Court cannot ignore the repeated and uniform utterances of the Supreme Court upon this subject.

In addition to the familiar and oft quoted authorities, see the following, decided at the present term:

Burt *vs.* Evory, Feb. 3, 1890; Hill *vs.* Wooster, Jan. 13, 1890; Day *vs.* Railway Co., 132 U. S., 98; Watson *vs.* Railway Co., *id.*, 161; Marchand *vs.* Emken, *id.*, 195; Royer *vs.* Roth, *id.*, 201.

Claim 14 may be construed as covering a combination, one element of which, the slots, etc., is new and useful, and is not covered by the other claims. The original specification and drawings, filed June 9, 1881, describe and show grooved, honeycombed and slotted plates. Indeed, the drawings, for the absence of which Case I is criticised, were filed at the outset in Case C.

Of Fig. 4, showing the slotted plate, the specification says:

"Here the supporting plate between the ribs is removed, the latter being supported by the heavier side or end ribs and other intermediate transverse ribs if necessary. This modification is in form somewhat like an ordinary window blind with the slats open."

This can mean nothing else except that there were openings extending entirely through the plate. The specification as originally filed is sufficient, therefore, to support the claim.

Regarding the infringement of this claim and claim 75 there can be no doubt, and the same is true of the claims in controversy, of Case I.

The point is suggested that the defendant Bracken is not proved to be an infringer, but the stipulation signed by the solicitors makes no distinction between the defendants.

The questions arising on the expiration of the Italian patent are of a serious character, and, in view of the elaborate attention given to the other defenses, would seem to demand greater consideration in the testimony and in the briefs. The patent appears in the record, but no word of explanation, so far as can be discovered, has been offered on the part of the defendants. The only testimony explanatory of the patent is the clear and positive statement of the complainant's expert, that it describes and claims inventions entirely different from those of the patents in controversy.

The patent contains five divisions and 32 claims. It requires little expert knowledge to perceive that some of these are wholly dissimilar to the inventions in suit. Others would seem to be dangerously near to some of the inventions, but those portions of the Italian patent which seem to the Court to be most in point are but little discussed and in some instances are not even alluded to in the defendants' brief.

For example, take a portion of Division D and its corresponding claims. The Italian patent says:

"To form an element having a core or body coated with the mass described, I take a sheet or other suitable piece of lead, or of other substance suitable for the purpose, and if necessary, roughen or score its surface, or pierce it with numerous perforations to insure a firm adhesion of the mass which is to constitute the active coating. I cover it with the finely divided superficially oxidized lead (or the mixture of metallic lead and lead oxide particles) and apply heavy pressure. The result is that the finely divided particles are not only pressed into a firm and strongly coherent mass, but the mass is also firmly united to the supporting core or body. This core may be of lead, or it may consist of non-oxidizable metal, such as gold or platinum, or any alloy of these metals with lead."

Claim 17 of the Italian patent is as follows:

"A process for making secondary battery elements (or material from which said elements can be constructed); said process consisting in covering one or more or all of the surfaces of a suitable metallic and electro-conducting core or body, either with superficially oxidized particles of lead, or with a mixture of particles of pure lead and lead oxide, and afterwards applying pressure sufficient both to unite said particles or mixture into a compact and firmly coherent mass, and to unite the mass to the core of body, as set forth in 'Division D.'"

Bearing in mind the fact that metallic lead and lead oxide are absorptive or active material, a comparison with some of the claims in controversy will certainly show marked features of similarity.

Claim 10 of Case I is as follows:

"In the process of making a secondary battery plate or element, combining by means of pressure an absorptive substance and suitable material to form a support therefor, substantially as set forth."

To the uninitiated it would seem that these claims are for similar inventions. Would not a person following the formula of the Italian patent infringe the pressure claims of the patent in suit? Is not the method of making electrodes by pressing active material upon the support set free by the expiration of the Italian patent?

It is true that Division D of the Italian patent describes also the process of uniting the absorptive substance into a compact or firmly adherent body or mass, without the intervention of a support plate, but to the ordinary reader, it would seem to be reasonably clear that when the inventor says, as in the description quoted, that he takes a sheet of lead, pierces it with numerous perforations, to insure a firm adhesion of the mass which is to constitute the active coating, covers the support with the mixture of metallic lead and lead oxide, and applies heavy pressure, so that the mass is not only pressed together, but is also firmly united to the supporting core, he is describing the process which is covered by the claim in question.

Other claims of the Italian patent are as follows:

"11. As a new article of manufacture, a mass consisting of a mechanical mixture, or association of metallic lead and oxide of lead, united by pressure into a coherent and firm body, substantially as set forth in 'Division D'."

"14. For use in an element of a secondary battery, a metallic core or body, to one or more sides of which is attached a mass or substance, primarily consisting of metallic lead and oxide of lead, united by pressure so as to be strong and firmly coherent, substantially as set forth in 'Division D.'"

"15. A secondary battery element, consisting of a metallic core or body, having attached to it a coating primarily consisting of mixed lead and oxide of lead, firmly united by pressure into a strong and coherent mass, substantially as set forth in 'Division D.'"

"16. A secondary battery element, consisting of the combination with a metallic supporting core or body, of a coating attached or united to said core; said coating primarily consisting of metallic lead and lead oxide in an intimately commingled state, united by pressure into a strong and firmly coherent mass, substantially as set forth in 'Division D.'"

It will be observed that the first of these, claim 11, covers only lead and oxide of lead, mixed and united by pressure into a coherent mass for use as an electrode or as a coating. The element of a support plate is wanting in this claim, but it is present under the name of "a metallic core or body," in all the others.

Compare these claims with the pressure claims of the patent in suit, but also compare them—and particularly claim 11—with claims 12 and 13 of Case I. They are as follows:

"12. Absorptive material, for use in secondary batteries, formed into a coherent mass by pressure, substantially as set forth.

"13. For use in secondary batteries, porous, granular, spongy, or equivalent lead formed into a coherent mass by pressure, substantially as set forth."

The language is different, but, in substance, where is the lack of identity?

But all these are questions which the Court, in view of the action of the American and Italian patent officials, in distinguishing between the inventions covered by the Italian patent and those covered by the patents in the suit, and in view of the uncontradicted opinion of the complainant's expert, should hesitate long before answering in the affirmative.

Mr. Weston says of "Division D" of the Italian patent:

"It is for an improved form of electrode especially adapted to the foundation by electrical disintegration, either by the Planté method, or by the peculiar method of electrical disintegration invented by Mr. Brush and described in Division A."

It should be remembered that we are dealing here with a mysterious and occult power of nature, the science of which is still in its infancy, the phenomena of which are but little understood, even by those who have made its study their life work. For one who has but a casual and superficial knowledge to place a construction upon a patent which is addressed to those who are educated in this department of science, and which constantly employs terms of art in opposition to the opinion of the only electrician who speaks upon the subject, would be unwarranted, especially when such a construction will destroy rights and interests of great value. In very many of the patent causes which come before the courts, where the device is so simple that any man of ordinary capacity can understand it, the presence of an expert is wholly unnecessary, but when the invention relates to a subject where even the pioneers are still groping in shadows, the Court needs the instruction of those most competent to advise and without such assistance should proceed with the utmost caution. The law does not favor forfeitures. A patent should never be declared invalid because of the expiration of a foreign patent if there is doubt about the inventions being the same. The burden is upon the defendants and the doubt should be resolved in favor of the patent.

After such study as I have been able to give the subject, I am not satisfied that the Italian patent is for the same invention as those in controversy. It is sufficient for present purposes to state that the mind of the Court is in doubt upon the question.

The language of Judge Bradley in the case of Bishhof *vs.* Wethered, 9 Wall., 812, where a patent was introduced as here, without explanation, seems particularly applicable.

"The specifications of patents for inventions are documents of a peculiar kind. They profess to describe mechanisms and complicated machinery, chemical compositions and other manufactured products, which have their existence *in pais* outside of the documents themselves; and which are commonly described by terms of the art or mystery to which they respectively belong; and these descriptions and terms of art often require peculiar knowledge and education to understand them aright; and slight verbal variations, scarcely noticeable to a common reader, would be detected by an expert in the art, indicating an important variation in the invention. Indeed the whole subject matter of a patent is an embodied conception outside of the patent itself, which, to the mind of those expert in the art, stands out in clear and distinct relief, whilst it is often unperceived, or but dimly perceived by the uninitiated. This outward embodiment of the terms contained in the patent is the thing invented, and is to be properly sought, like the explanation of all latent ambiguities arising from the description of external things, by evidence *in pais*."

It was, therefore, decided that the Circuit Court was right in charging the jury that there was not on the face of the respective patents such an identity as authorized the court to pronounce that they were for one and the same invention.

No. 260,654 is not, in any event, affected by the Italian patent. The former bears date July 4, 1882, the latter August 8, 1882, and it was not applied for till July 28, 1882.

It follows that upon filing a disclaimer of the invalid claims, the complainant is entitled to a decree in accordance with this opinion, but without costs.

In connection with this decision the following statement should, I think, be made:

A suit similar to this is pending against the Electrical Accumulator Company. Some time after the oral argument in this cause was concluded, the counsel for that company, after due motion to all parties interested, called the attention of the Court to the following facts:

On the 28th of March, ten days after the decision on the Faure patent was filed, the president and secretary of the Julien Company, without the knowledge or consent of counsel, obtained from the complainant an option to take an exclusive license under the patents in suit provided they were sustained.

In view of these facts the Court was asked either to refuse to decide the cause altogether or to postpone the decision until the cause against the Accumulator Company is ready for argument.

The Court urged upon counsel the importance of having the issues passed upon in a controversy which is, in all respects, genuine and earnest, and expressed his own disinclination to decide an action where a suspicion to the contrary might exist. Several plans were suggested, but none upon which counsel could agree. As a decision in the other cause will not be reached for a year, and as the option alluded to is not regarded as a settlement of the cause, the conclusion has been reached that justice to the parties demands that a decision should be made at this time.

I regret having to inflict so long an opinion upon litigants and counsel, but the examination and study of a record and briefs aggregating twenty five hundred printed pages, has made it impossible to devote the necessary time to review and condensation.

Ohio Electric Light Association.

Representatives of the electric light companies from 23 cities and towns in the State were in session last week at the Neil House, Columbus, for the purpose of forming a State organization. Delegates were present from the four Cincinnati companies, two Cleveland companies, two Dayton companies, Columbus, Springfield, Troy, Xenia, Findlay, Lebanon, Tiffin, Pomeroy, Middleport, Nelsonville, Athens, Delphos, New Philadelphia, Oxford, Youngstown, Washington C. H., Bucyrus, Fostoria, Lima, Zanesville, and other cities.

A temporary organization was effected by electing ex-Mayor Amor Smith, of Cincinnati, president, and W. M. Kuebz, of New Philadelphia, secretary. Considerable time was devoted to discussing Senator Adams' bill, which prohibits the use of any system of electric lights that is dangerous to human life. During the discussion it was developed that over $5,000,000 are now invested in electric light plants in this State, which are operated upon the high tension system, and the conclusion was reached that the passage of this bill would practically wipe the business out of existence.

The executive committee, under instructions from the meeting, reported a constitution and by-laws for a State organization to be known as the Ohio Electric Light Association. The constitution was adopted, and is to be sent to the various electric light companies in the State for ratification, and at the same time to signify whether they will become members of the association.

KINDRED INTERESTS

Noll & Davis, electrical contractors, No. 49 Twenty-second street, New York, are agents for the Universal Arc Lamp Company, and are dealers in general electric light and power apparatus. They equip buildings with the Interior electrical conduits for any incandescent system, making a specialty of this class of work.

Installation of New Machinery is the order of the day at the Eclipse Wind Engine Works, Beloit, Wis. This company is now prepared to execute orders for designs and complete equipments for power plants, including steam engines, sheaves (whole or split with friction clutches) for rope transmission, Eclipse friction clutch pulleys, stands, shafting, etc. For electric light stations, everything is furnished except dynamos and conducting wires.

Mr. J. A. Seely, of the Complete Electrical Construction Company, reports that his firm has just obtained a contract from the Commercial Cable Company, to build for them the subways required in the lower part of the city. The contract includes the construction of 56 manholes, and the work will be done under the supervision of Mr. Charles Cutriss, electrician for the cable company. Mr. Seely's company will also wire the new *World* Building and the Union Trust Company's Building, for telegraph, telephone, messenger, and house telephone service. The *World* Building alone, will require 15 miles of double telephone wire. The Trust Company will also be wired for quotation tickers.

The Tucker Electrical Construction Company, of this city, feel justly proud of the fact that the big job of installing the complete electric plant in the Progress Club, of this city, was so successfully done. That a plant of this magnitude was completed so promptly and was started without a single hitch at any point, is the strongest kind of proof of the perfect work done by this company. A recent contract they have secured is at Newport, where they do all the electric wiring of the new residence of Ogden Goelet. This residence is said to be the largest in the United States, being 175x150 feet and containing 54 bedrooms. All the electric light and other wiring will be done by the Tucker Company.

The Thomson-Houston Electric Company reports the following sales of arc apparatus to central stations: Miamisburg, O., 50; Wilkinsburg, Pa., 30; Seattle, Wash., 45; New Berne, N. C., 30; London, O., 85; Troy, O., 50; Savannah, Ga., 100; Birmingham, Conn., 50; Corning, N. Y., 50; Gt. Falls, N. H., 100; Cincinnati, O., 150; Jeffersonville, Ind., 50; Bradford, Pa., 50; Camden, N. J., 50; Woburn, Mass., 50; Barberville, Ky., 50; Colorado Springs, Col., 35; Fort Smith, Ark., 35; Freeport, Ill., 50; Shreveport, La., 75; Matoon, Ill., 50; Pueblo, Col., 50; Gt. Falls, Mont., 100; Johnstown, Pa., 50; Chicago, Ill., 70; Sheboygan, Wis., 150.

The Eddy Motor Company.—When Judge Hayden leased his fine buildings to the Eddy Electric Manufacturing Company he made no mistake nor did the Eddy Company make any when they removed their plant from Hartford to Windsor, says the Hartford *Times*. The machinery was removed to Windsor in May, 1888, and 30 employés were given places. The business of the company has increased ever since, and the capital stock, which is all paid in, has more than doubled. The company now employs 50 or more men. The employés must be skilled mechanics, and it may be safely said that few, if any, manufacturing establishments employ a better class of workmen than the Eddy Company. They are sober, industrious men, who take pride in being well behaved and well dressed, and who pay their bills and are first-class citizens.

The Central Electric Company, of Chicago, are proudly showing the following to their Okonite customers:

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Gentlemen: Referring to conversation with you in which I voluntarily indicated the satisfaction that I have had in the use of Okonite wire in every place where I have had occasion to use a wire of extra insulation, I will say herein that I have used Okonite wire for the purpose of transmitting heavy currents in coal mines. I have had this wire in use under the most trying circumstances; in one mine in particular its durability has been surprising. In this case I been using a cable for conducting 60 amperes under 220 volts pressure to a mining machine situated 100 feet from the main conductors. These wires were laid along on the ground in the mud and were being daily trampled on by mules and miners. It is useless to say that I have protested very strongly against such treatment, but they fail to construct their circuits differently as long as they continue so satisfactory in their present condition. This cable has been in daily use since about the first of last May.

Yours truly,
FOREE BAIN,
Electrical and Mechanical Engineer.
Chicago, March 12, 1890.

A Million Volts.

During the investigations of the Senate committee on general laws, Prof. Morton, of Stevens Institute of Technology, had been called as an expert, at a recent meeting of the committee.

Senator Vedder wanted to know what voltage was within the limit of safety.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON MARCH 18, 1890.

423,408 Centrifugal machine; Dana H. Benjamin, Utica, N. Y., assignor to Edward Hurlburt, same place.

423,421 Apparatus for producing steam, heat and light by electricity; Theophilus D. Farrall, Michigan City, Ind.

423,432 Hydrocarbon burner; Chas. H. Land, Detroit, Mich.

423,449 Electric wire molding; John A. Seely, Brooklyn, N. Y.

423,462 Electric switch; Geo. H. Whittingham, Baltimore, Md., assignor to the Automatic Electric Switch Co., same place.

423,468 Electrical connection with car tracks; Geo. G. Campbell, Milwaukee, Wis.

423,477 Pneumatic railway signal; Aaron G. Ingham, Omaha, Neb.

423,487 Fire or police telegraph; Geo. C. McCullough, Richmond, Ind., assignor of one-third to John B. Dougan, same place.

423,488 Electric switch; Thos. F. McEvoy, Waterbury, Conn.

423,494 Annunciator; Chas. E. Scribner, Chicago, Ill., assignor to the Western Electric Co., same place.

423,495 Crossing for electric conductors; Harry A. Seymour, Washington, D. C., assignor to the Short Electric Railway Co., Cleveland, Ohio.

423,527 Electrical conductor; Geo. E. Miller, Lynn, Mass.

423,549 Electro-therapeutic appliance; Chas. E. Brunning, Stockton, Kan.

423,552 Electric railway system. 423,553 Alternating current electric regulator; Ludwig Gutmann, Fort Wayne, Ind.

423,554 Switch or signal setting apparatus. 423,555 Brake operating mechanism. 423,556 Switch operating mechanism. 423,557 Car brake; John Hahn, New York, N. Y.

423,575 Individual telephone call; Joseph Sack, Dusseldorf, Germany.

423,594 Galvanic battery; Martin M. Clark, Chicago, Ill., assignor to the Western Electric Co., same place.

423,600 Ampere meter; Gustav A. Freie, Boston, Mass., assignor to the Bernstein Electric Co., Portland, Me.

423,612 Converter; Rodney F. Ludlow, Springfield, Ohio.

423,616 Galvanic apparatus for dental surgery. 423,617 Electrical device for use in dental operations; Chas. W. Manker, Nebraska City, Neb, and Geo. F. Manker, Bedford, Iowa, assignors of one-third to Henry E. Manker, Elliott, Iowa.

423,632 Electric wire supporter; William F. Rothenberg, Denver, Colo., assignor of one-half to Joseph Turree, same place.

423,635 Centrifugal bolt; Robert Schulze, Covington, Ky.

423,637 Carbon rod for arc lamps. 423,638 Cut-out for electric arc lamps; Chas E. Scribner, Chicago, Ill., assignor to the Western Electric Co., same place.

423,662 Lubricator; Gilman W. Brown, West Newbury, Mass.

423,707 Electric bell; Arthur F. Stanley, New York, N. Y.

423,708 Static electrical machine; Hugo Tiemann, Cleveland, Ohio, assignor to the United States Mine Supplies Co.

423,731 Machine for making welded chains; Jas. J. Cheesman, Altoona, Pa., assignor of one-third to Chas. Baltzell, same place.

423,732 Method of welding metals by electricity. 423,733 Method of and apparatus for electric welding. 423,734 423,735 Method of welding metals by electricity; Chas. L. Coffin, Detroit, Mich.

423,753 Electric burglar and fire alarm; William Gee, New York, N. Y.

423,788 Lightning arrester; Geo. S. Maxwell, Louisville, Ky.

423,805 Motor for operating churns; Jack Paggs Milford, Texas.

423,807 Arc lamp; Henry Pieper, Flls, Liege, Belgium.

423,842 Thermostat; Joseph Nach, Höchst-on-the-Main, Prussia, Germany.

423,862 Dynamometer or power scale. 423,863 Dynamometer; James Emerson, Willimansett, assignor to the Emerson Power Scale Co., Florence, Mass.

423,873 Elevating and lowering electric lights; Robt. Kinney and John P. Hebendahl, Weatherly, Pa.

423,874 Means for supplying electricity to tram cars; Alexander L. Lineff, Chriswick, County of Middlesex, England.

423,886 Electric railway gate; Morton Toulmin, Baltimore, Md.

423,891 Switch for electric apparatus; Samuel L. Barriett, New Orleans, La., assignor to the Southern Electrical Manufacturing and Supply Co., Limited, same place.

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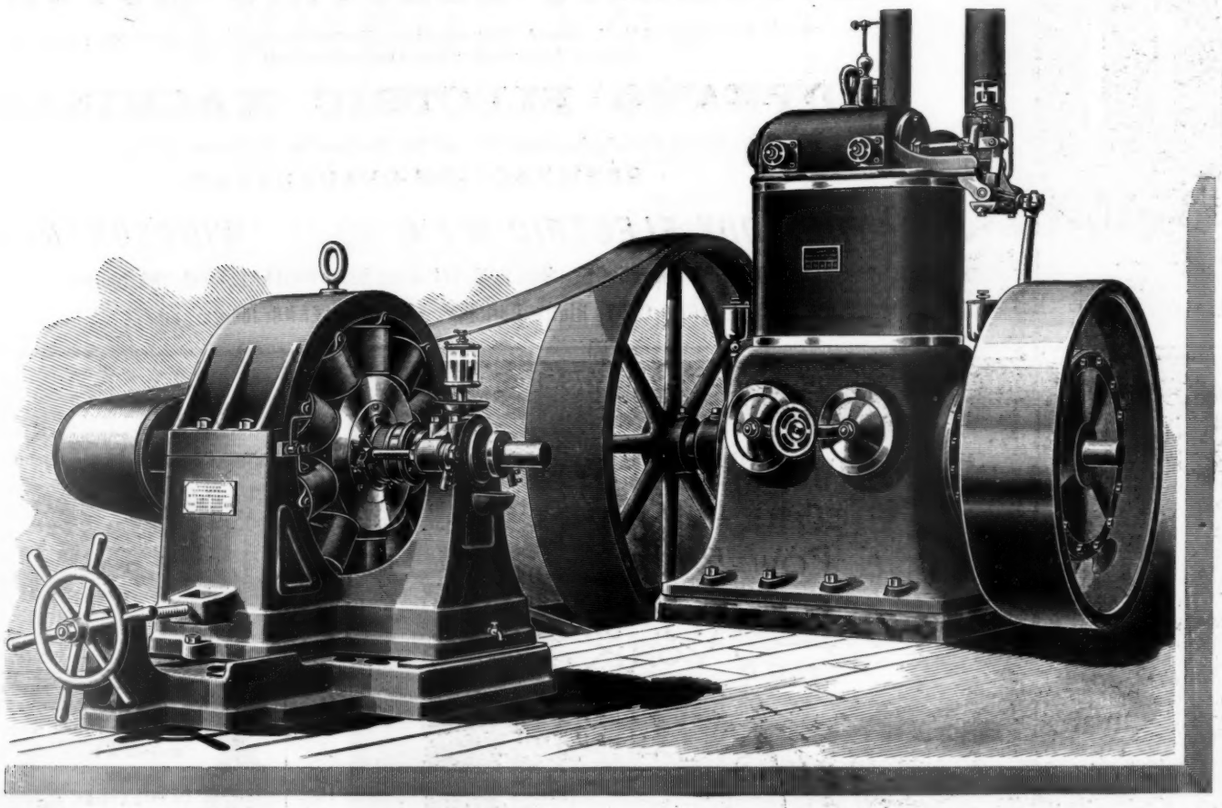

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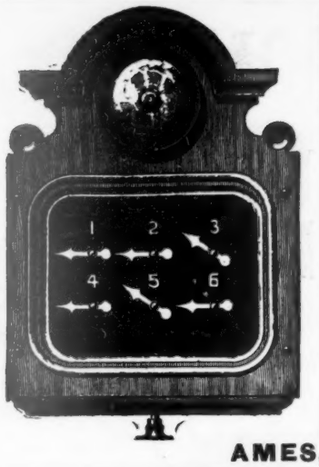

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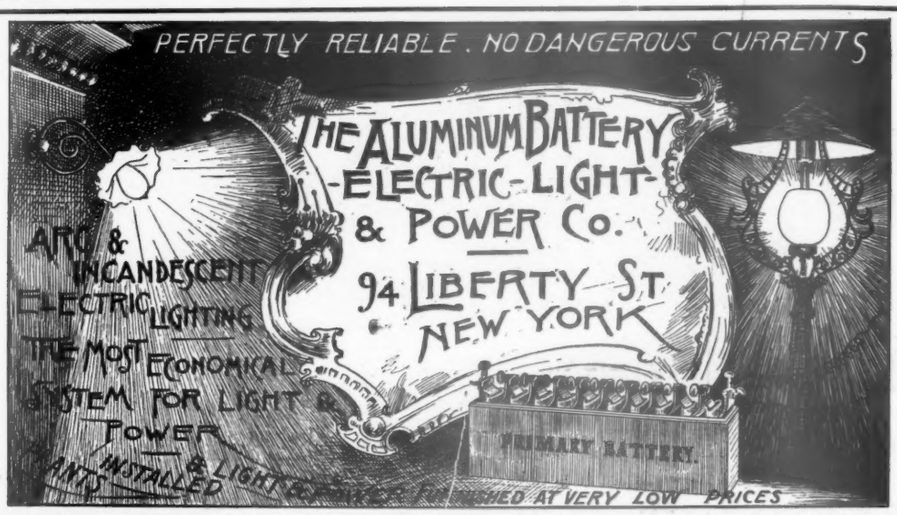

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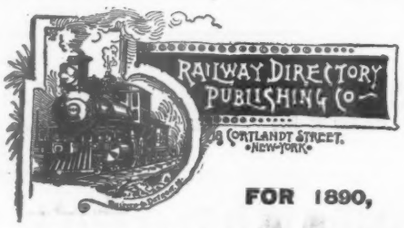

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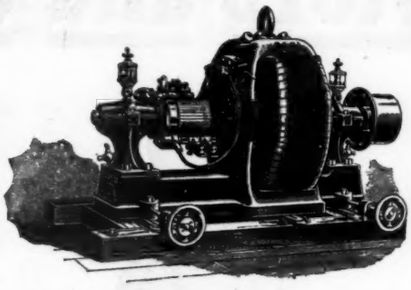

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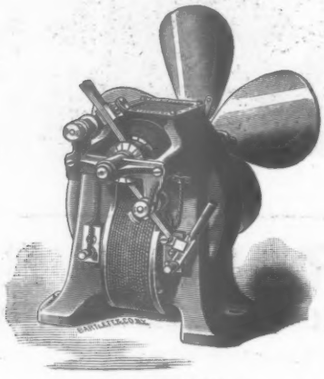

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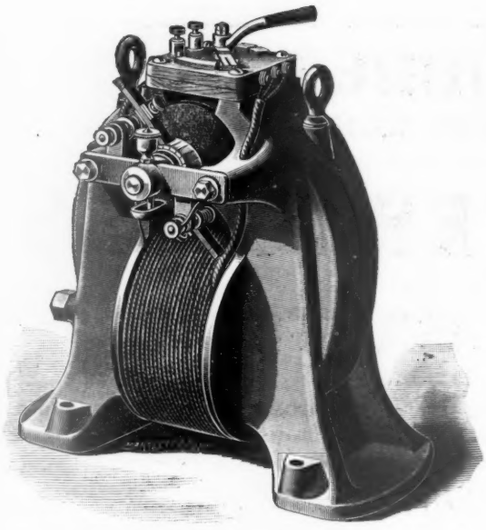

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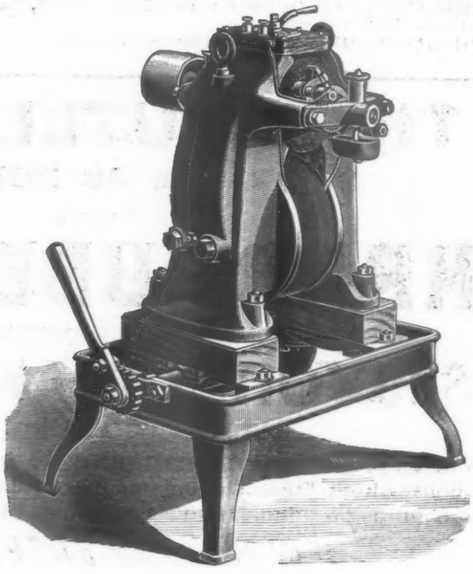

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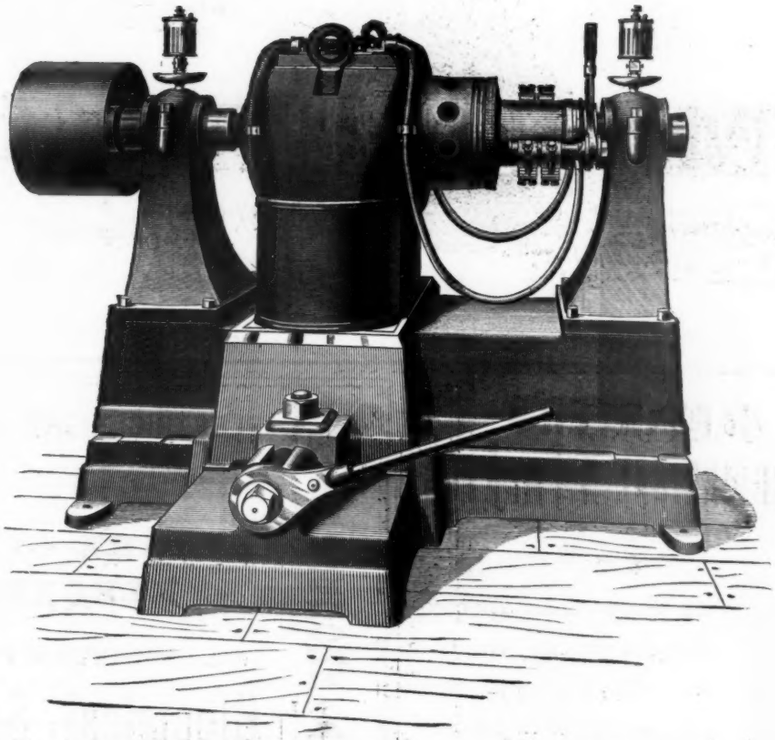

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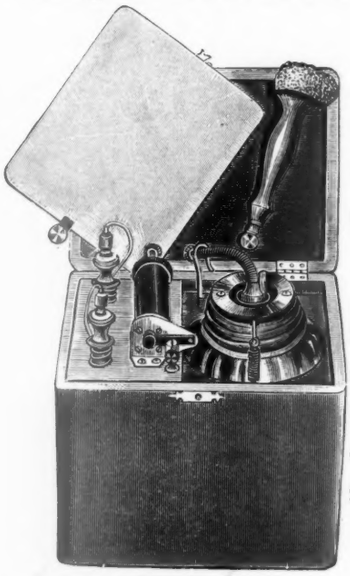

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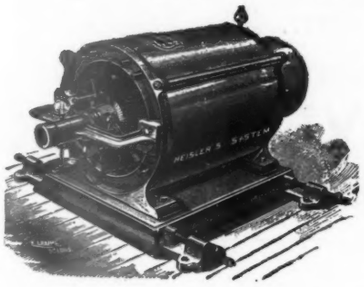

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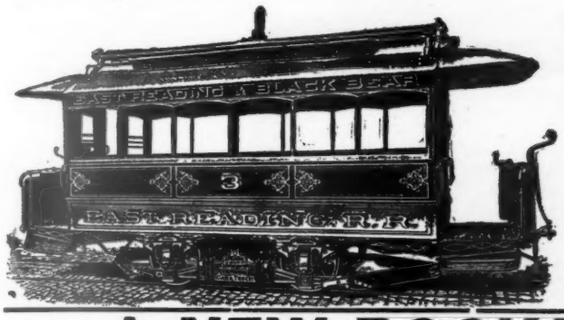

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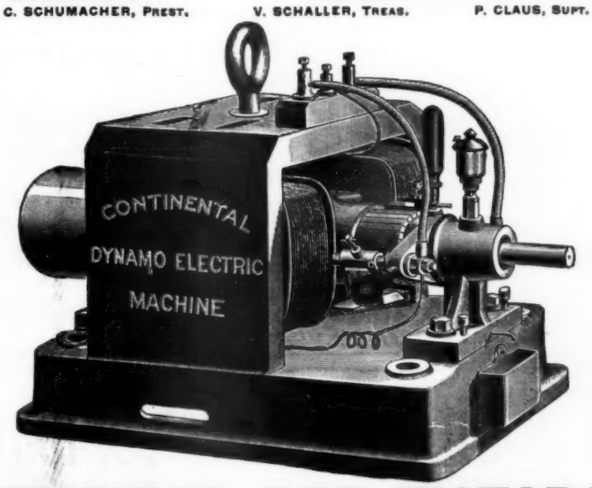

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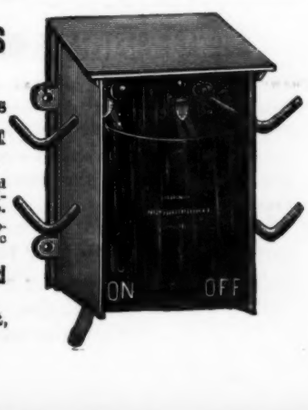

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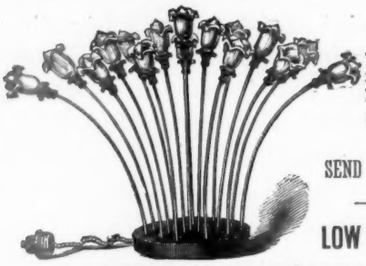

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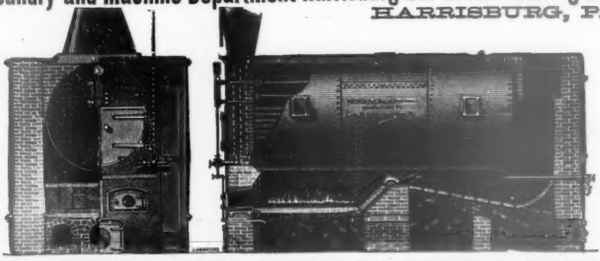

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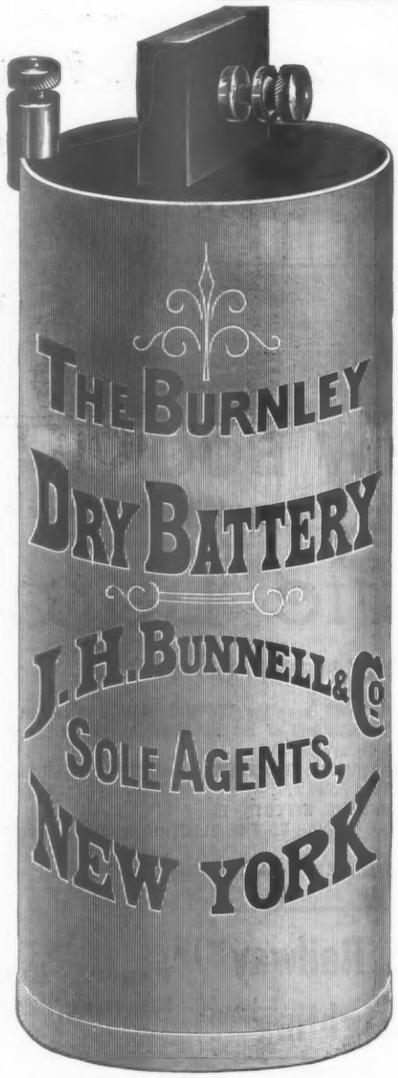

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C	8	.....	.....	.....	6.5	1¼	5,000 FEET PER MINUTE.	830
C	.....	10	.....	.....	8.3	1½		830
C	.....	.....	.....	25	8.0	2		830
C	16	.....	.....	.....	12.0	2¼		780
C	.....	20	.....	.....	12.5	2½		780
C	.....	.....	30	.....	13.0	2⅝		780
C	20	.....	.....	.....	15.0	3		990
C	.....	25	.....	.....	15.6	3		990
C	.....	.....	32	.....	18.0	3		990
C	.....	.....	.....	50	16.0	3		990
C	28	.....	.....	.....	21.0	4¼		1,360

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C	.....	35	.....	.....	21.0	4	5,000 FEET PER MINUTE.	1,360
C	.....	.....	45	.....	21.0	4		1,360
C	.....	.....	.....	70	21.0	4½		1,360
H	40	.....	.....	.....	29.7	6		1,750
H	.....	50	.....	.....	30.0	6		1,750
I	.....	.....	64	.....	29.5	6		1,750
I	52	.....	.....	.....	38.0	8		2,290
L	.....	65	.....	.....	38.6	8		2,290
L	.....	.....	83	.....	38.0	8		2,290
K	64	.....	.....	.....	46.5	10		2,770
K	.....	80	.....	.....	47.1	10		2,770
K	75	.....	.....	.....	52.5	12		3,300

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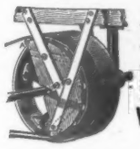

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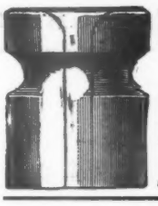

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(Signed,) "THOS. LOWREY, President."

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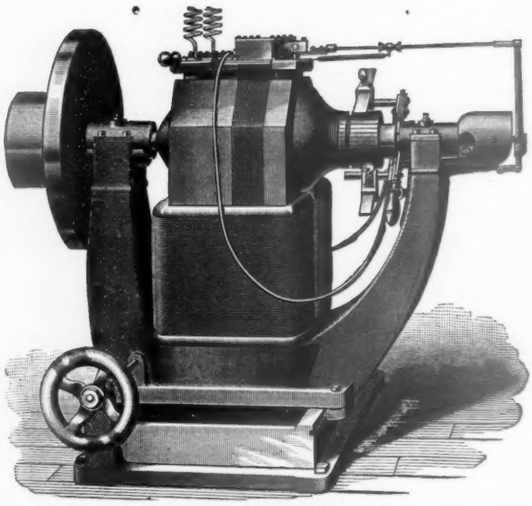

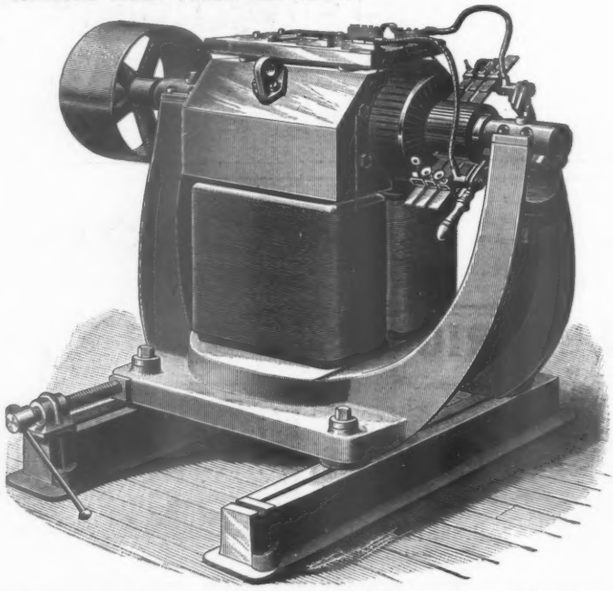

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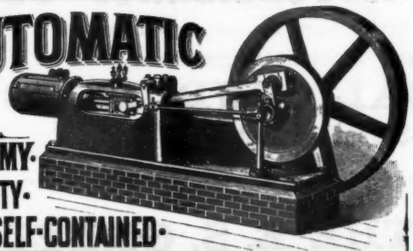

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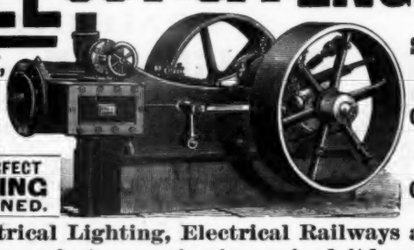

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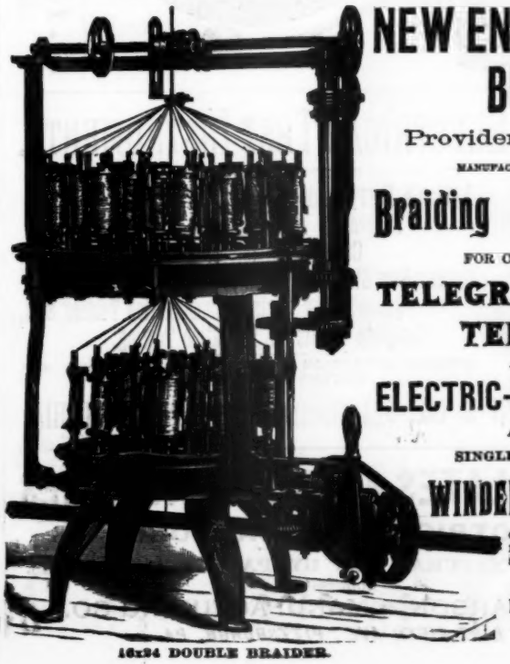

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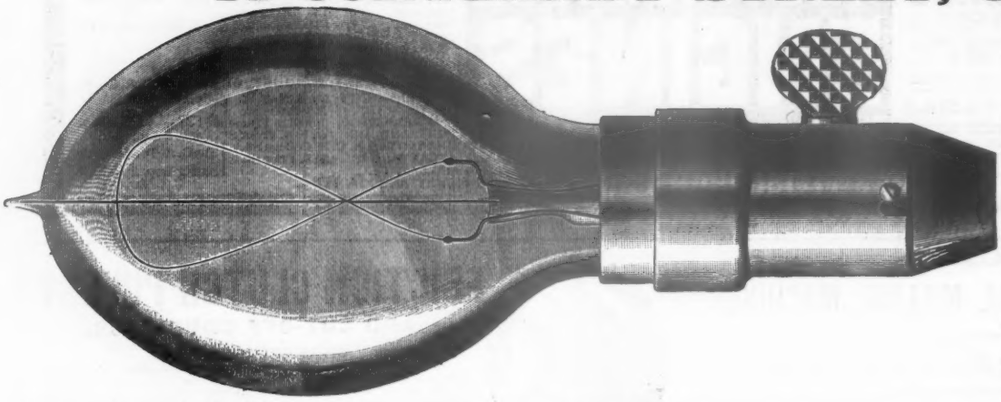

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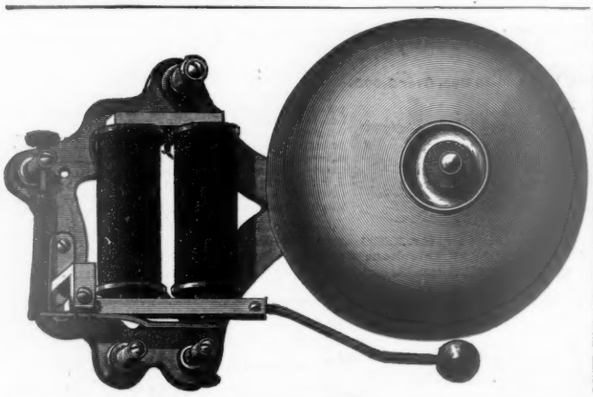

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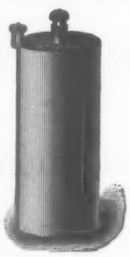

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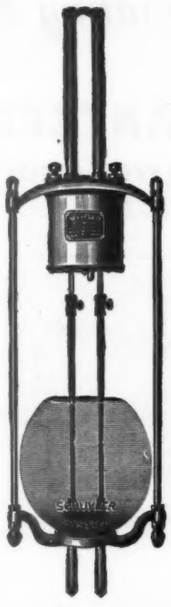

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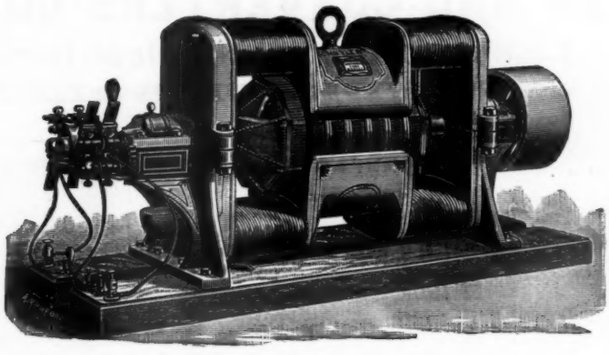

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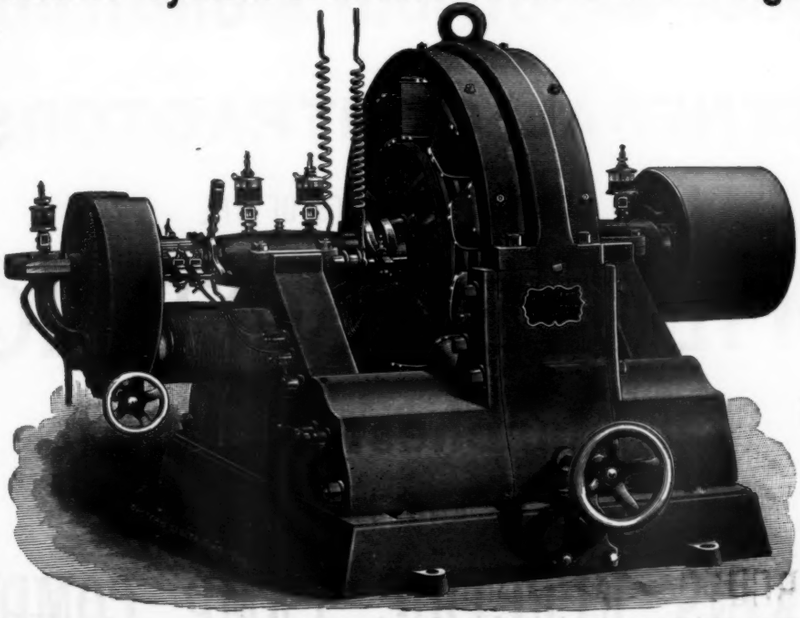

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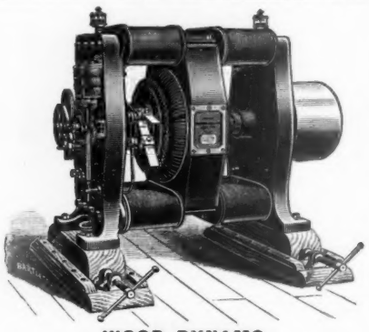

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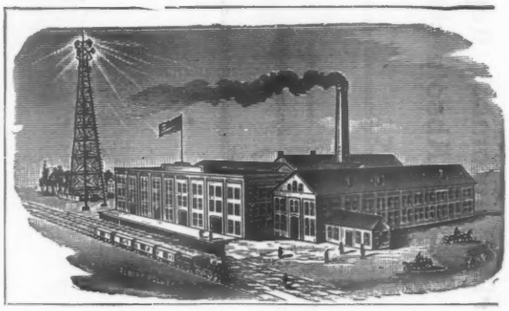

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